

CHAPTER FOUR

Alternatives

Table of Contents

4.1. Introduction 5
4.2. Alternatives Evaluation Criteria 6
4.3. Runway Alternatives 7
4.3.1. Runway Alternative A: All Runways Open 8
4.3.2. Runway Alternative B: Runway 9/27 Closure 8
4.3.3. Runway Alternative C: Runway 13/31 Closure 8
4.3.4. Runway Alternative D: Closure of Runways 9/27 and 13/31 9
4.3.5. Runway Alternatives Evaluation 9
4.4. Runway End Alternatives 12
4.4.1. Runway End 14 Alternatives 12
4.4.1.1. RE 14 Alternative A: ROFA Mitigation with MOS 12
4.4.1.2. RE 14 Alternative B: ROFA Mitigation with Runway End Shift 14
4.4.1.3. Runway End 14 Alternatives Evaluation 16
4.4.2. Runway End 32 Alternatives 17
4.4.2.1. RE 32 Alternative C: Temporary Floodwall Realignment 18
4.4.2.2. RE 32 Alternative D: Permanent Floodwall and Raised Runway Environment 22
4.4.2.3. RE 32 Alternative E: Temporary Floodwall Realignment & Declared Distances 24
4.4.2.4. Runway End 32 Alternatives Evaluation 26
4.4.3. Runway End 9 Alternatives 27
4.4.3.1. RE 9 Alternative F: VSR Removal 27
4.5. Taxiway Alternatives 28
4.5.1. Taxiway Alternative A: Full Length Runway 14/32 East Side Parallel Taxiway 28
4.5.2. Taxiway Alternative B: Runway 9/27 North Side Partial Parallel Taxiway 31
4.5.3. Taxiway Alternative C: Taxiway C1 Relocation 33
4.5.4. Taxiway Alternative D: Taxiway B Connector Removal 35
4.5.5. Taxiway Alternative E: Taxiway E Realignment 37
4.5.6. Taxiway Alternative F: Engine Run-up Area Standardization 39
4.5.7. Taxiway Alternatives Summary 41
4.6. Land Development Opportunities 41
4.6.1. Southwest Development Alternative 41
4.6.2. Northeast Development Alternatives 44
4.6.2.1. NE Alternative A: Taxiway D Removal Concept 44

4.6.2.2. NE Alternative B: Taxiway D Retention Concept 46
4.6.2.3. NE Alternatives Evaluation....48
4.6.3. Terminal Apron Expansion Alternative....48
4.7. Support Facility Alternatives 51
4.7.1. Consolidated Maintenance Facility 51
4.7.1.1. CMF Alternative A: North of Northeast Development Area....51
4.7.1.2. CMF Alternative B: Northeast Development Area Integration....54
4.7.1.3. CMF Alternatives Evaluation....56
4.7.2. Advanced Air Mobility (AAM) Development 56
4.7.2.1. AAM Alternative A: South of Northeast Development Area Along Taxiway E 57
4.7.2.2. AAM Alternative B: North of Northeast Development Area Along Taxiway E 58
4.7.2.3. AAM Alternative C: Along Taxiway D and Taxilane Cedar 58
4.7.2.4. AAM Development Alternatives Summary 58

List of Figures

Figure 4.1 - Preferred Runway Layout Alternative C: Runway 13/31 Closure 11
Figure 4.2 - RE 14 Alternative A: ROFA Mitigation with MOS 13
Figure 4.3 - RE 14 Alternative B: ROFA Mitigation with Runway End Shift 15
Figure 4.4 - RE 32 Alternative C: Temporary Floodwall Realignment (Floodwall Down) 19
Figure 4.5 - RE 32 Alternative C: Temporary Floodwall Realignment (Floodwall Up).....21
Figure 4.6 - RE 32 Alternative D: Permanent Floodwall and Raised Runway Environment 23
Figure 4.7 - RE 32 Alternative E: Temporary Floodwall Realignment & Declared Distances.....25
Figure 4.8 - Taxiway Alternative A: Full Length Runway 14/32 East Side Parallel Taxiway 30
Figure 4.9 - Taxiway Alternative B: Runway 9/27 North Side Partial Parallel Taxiway 32
Figure 4.10 - Taxiway Alternative C: Taxiway C1 Relocation.....34
Figure 4.11 - Taxiway Alternative D: Taxiway B Connector Removal 36
Figure 4.12 - Taxiway Alternative E: Taxiway E Realignment.....38
Figure 4.13 - Taxiway Alternative F: Engine Run-up Area Standardization 40
Figure 4.14 - Southwest Development Alternative 43
Figure 4.15 - NE Alternative A: Taxiway D Removal Concept 45
Figure 4.16 - NE Alternative B: Taxiway D Retention Concept 47
Figure 4.17 - Terminal Apron Expansion Alternative.....50
Figure 4.18 - CMF Alternative A: North of Northeast Development Area.....53
Figure 4.19 - CMF Alternative B: Northeast Development Area Integration.....55
Figure 4.20 - Potential Locations for AAM Development Area 60

List of Tables

Table 4.1 - Evaluation of Runway Alternatives....10
Table 4.2 - Evaluation of Runway End 14 Alternatives....17
Table 4.3 - Evaluation of Runway End 32 Alternatives....27
Table 4.4 - Preferred Taxiway Alternatives....41
Table 4.5 - Evaluation of Northeast Development Alternatives....48
Table 4.6 - Evaluation of Consolidated Maintenance Facility Alternatives....56

4.0 Alternatives

4.1. Introduction

The development of alternatives for the STP 2045 Long-Term Plan (LTP) is grounded in the findings of the accompanying Floodwall Feasibility Study Report, which evaluated the effectiveness and limitations of the existing flood protection system and its influence on future airfield development. The feasibility study (**Appendix A** of this LTP) assessed both the hydraulic performance of the Mississippi River adjacent to the Airport and the operational implications of potential floodwall configurations, with the goal of identifying strategies that balance flood risk management, regulatory compliance, operational resiliency, and long-term development flexibility.

A key outcome of the feasibility study is the recognition that STP's proximity to the Mississippi River and its location within a Federal Emergency Management Agency (FEMA) floodway and floodplain present significant constraints to airfield expansion and modification. Hydraulic modeling conducted as part of the study confirmed that encroachment into the river corridor results in measurable upstream impacts, limiting the ability to extend airfield infrastructure beyond the existing footprint without exceeding allowable floodway thresholds. As a result, alternatives involving runway or infrastructure expansion further south into the Mississippi River were determined to be infeasible and were removed from consideration. This finding establishes a fundamental planning parameter for the Alternatives analysis: all viable concepts must be accommodated within the existing airport footprint and must avoid impacts to the river corridor.

Within these constraints, the feasibility study identified viable floodwall alignment and configuration strategies that support continued airfield operations while improving compliance with applicable standards and reducing long-term operational limitations. These findings directly inform the development of primary runway alternatives for Runway 14/32, particularly at the Runway 32 end, where floodwall configuration, airspace protection surfaces, and safety area requirements are tightly interrelated. The feasibility study therefore serves as the foundation for evaluating primary runway alternatives that maximize usable runway length, maintain operational capability under both normal and flood conditions, and reduce reliance on temporary solutions.

The constraints and opportunities identified in the floodwall feasibility study create a cascading effect across the airfield. Decisions made at the flood protection and primary runway level directly influence the feasibility, configuration, and performance of subsequent alternatives, including secondary runways, taxiways, aprons, and landside development areas. For example, the achievable configuration of Runway 14/32 influences runway length availability, arrival and departure performance, and aircraft operating envelopes, which in turn affect taxiway geometry, airfield circulation patterns, and the location and viability of developable land for hangar and support facilities. Accordingly, all alternatives presented in this chapter are developed as part of an integrated system, where each element is evaluated in the context of the broader airfield layout and the constraints established by the floodwall feasibility analysis.

This chapter presents a comprehensive evaluation of alternatives within this framework. The chapter begins with high-level airfield layout alternatives, including potential runway closure scenarios to optimize overall airfield configuration, and then evaluates individual runway end alternatives. Subsequent sections address taxiway and taxilane alternatives, land development opportunities (including potential hangar development areas) and support facility alternatives. These alternatives

provide a range of feasible concepts for accommodating future aviation demand while addressing the operational, regulatory, and environmental constraints that define STP's long-term development potential.

4.2. Alternatives Evaluation Criteria

To support a consistent and objective comparison of potential development concepts, a set of evaluation criteria was developed based on the findings of the Inventory of Existing Conditions, Aviation Forecasts, and Facility Requirements chapters, as well as coordination with the Metropolitan Airports Commission (MAC). These criteria are intended to apply broadly to all alternatives evaluated throughout this chapter, including airfield layout concepts, floodwall-related alternatives, and other airside or landside improvements.

The criteria reflect the primary planning drivers at STP, including safety and design standard compliance, operational performance under both standard and floodwall conditions, and the ability to support long-term development within a constrained airport footprint. Each alternative is evaluated qualitatively against the criteria described below to assess tradeoffs and inform identification of a preferred development strategy.

1. **Airfield Safety and Design Compliance**

This criterion evaluates the extent to which an alternative improves compliance with Federal Aviation Administration (FAA) design standards and mitigates non-standard conditions identified in **Chapter 3**. Key considerations include the elimination or reduction of Runway Safety Area (RSA), Runway Object Free Area (ROFA), and Taxiway Object Free Area (TOFA) intrusions; resolution of geometric deficiencies; and reduction of runway incursion mitigation (RIM) concerns and FAA hot spots. Alternatives that simplify airfield geometry, reduce conflicts between airfield elements, and minimize reliance on Modifications of Standards (MOS) are rated more favorably.

2. **Operational Capability and Flexibility**

This criterion evaluates how effectively an alternative supports safe and efficient airport operations under standard (non-floodwall) conditions. Considerations include the ability to accommodate the existing and forecast aircraft fleet mix, maintain operational flexibility across a range of weather conditions, and provide redundancy within the airfield system where appropriate. For airfield alternatives, this includes maintaining adequate crosswind coverage and efficient aircraft circulation. For landside and facility-related alternatives, this includes supporting functional access, circulation, and operational efficiency for tenants and users.

3. **Floodwall Compatibility and Operational Resiliency**

This criterion evaluates how well an alternative performs under floodwall deployment conditions and the extent to which it improves overall resiliency during flood events. As documented in previous chapters, STP operates under two distinct configurations depending on whether the floodwall is deployed, with associated impacts to runway availability, usable length, airfield access, and supporting infrastructure. Under this criterion, alternatives are assessed based on their ability to minimize operational disruptions, maintain usable airfield and landside facilities during floodwall conditions, reduce the need for complex reconfiguration, and improve consistency between standard and floodwall operations. Alternatives that enhance reliability and reduce operational impacts during flood events are rated more favorably.

4. **Development Potential and Land Use Efficiency**

This criterion evaluates the extent to which an alternative supports efficient use of airport property and provides opportunities for future development. Key considerations include the amount and configuration of land made available for aeronautical or non-aeronautical uses, the flexibility of that land to accommodate future facilities, and the overall efficiency of the Airport layout. Alternatives that consolidate infrastructure, reduce physical constraints, and create usable, contiguous development areas are rated more favorably.

5. **Implementation Feasibility and Cost**

This criterion evaluates the relative complexity, constructability, and cost implications of each alternative. Considerations include the extent of required modifications to existing infrastructure, potential relocation of facilities, constructability within an active airfield environment, and the level of coordination required with regulatory agencies. A relative assessment is used to compare alternatives based on anticipated level of effort and implementation complexity. Alternatives that can be implemented with fewer constraints, lower disruption, and more straightforward phasing are rated more favorably.

The development alternatives are rated on a scale of 0 to 3 for each evaluation criteria as described below. The sums of the ratings are then examined to determine recommended alternatives for the Airport.

- 0 = Does not satisfy evaluation criteria
- 1 = Provides some benefit, but short of fully satisfying evaluation criteria
- 2 = Satisfies evaluation criteria, with minor challenges
- 3 = Satisfies evaluation criteria or no negative impact

4.3. Runway Alternatives

The STP runway system consists of a primary runway (Runway 14/32) and two crosswind runways (Runways 13/31 and 9/27). As documented in **Chapter 3 – Facility Requirements**, the existing geometry generally meets FAA design standards and is capable of accommodating existing and forecast aviation activity. However, several design and operational considerations affect the long-term viability of maintaining all three runways.

As part of this LTP Update, the MAC has expressed interest in evaluating the potential closure of one of the crosswind runways. This direction is supported by findings from the facility requirements analysis. Runway 14/32 provides nearly sufficient crosswind coverage (94.91 percent), and Runway 9/27 has been designated as a legacy crosswind runway under current FAA guidance, while Runway 13/31 does not meet this designation. In addition, the current three-runway configuration introduces geometric complexity, including overlapping safety areas, object free area interactions, and other non-standard conditions associated with intersecting runways. These factors indicate that a simplified runway configuration may meet long-term operational needs while reducing complexity and improving compliance with FAA design standards.

This section evaluates a range of airfield layout alternatives to support long-term decision-making. The alternatives are structured to represent a full range of possible configurations, from maintaining the existing three-runway system to removing one or both crosswind runways.

4.3.1. Runway Alternative A: All Runways Open

Alternative A maintains the existing three-runway configuration, with Runway 14/32 operating as the primary runway and Runways 13/31 and 9/27 retained as crosswind runways. This scenario preserves the current level of operational flexibility and allows the Airport to continue accommodating a range of aircraft and operating conditions. Under this configuration, approximately 34.6 acres within the Airport boundary are available for future aeronautical development. These areas provide opportunities for facilities such as hangars and apron expansion without modifying the runway system.

This alternative is not driven by capacity or demand constraints. As documented in **Chapter 3**, the existing runway system is capable of accommodating current and projected activity levels. Instead, Alternative A serves as a baseline condition, also known as a "No Action Plan," for comparison with other alternatives that modify the runway system. This condition is also evaluated as a part of the environmental analysis as the baseline condition in evaluating environmental impacts.

4.3.2. Runway Alternative B: Runway 9/27 Closure

Alternative B evaluates the closure of Runway 9/27 while maintaining Runway 14/32 as the primary runway and Runway 13/31 as the remaining crosswind runway. This results in a two-runway configuration. The removal of Runway 9/27 would make approximately 55.1 acres within the Airport boundary available for aeronautical use development. This land becomes available through the removal of the runway and associated safety areas.

This alternative would eliminate localized non-standard conditions associated with Runway 9/27. These include a vehicle service road located within the Runway 9 RSA and associated conflicts within the ROFA. Additional issues include roadway penetration into the TOFA adjacent to the runway corridor. Removing Runway 9/27 eliminates these conditions and associated compliance issues.

However, this alternative does not address the more significant non-standard conditions associated with the interaction between Runways 13/31 and 14/32. As a result, while Alternative B increases developable land and reduces localized compliance issues, it does not resolve the primary airfield geometry constraints identified in **Chapter 3**.

4.3.3. Runway Alternative C: Runway 13/31 Closure

Alternative C evaluates the closure of Runway 13/31 while maintaining Runway 14/32 as the primary runway and Runway 9/27 as the remaining crosswind runway. This results in a two-runway configuration that maintains crosswind capability. The removal of Runway 13/31 would make approximately 43.7 acres within the Airport boundary available for aeronautical use development. This land becomes available due to the removal of runway pavement, associated safety areas, and intersecting runway geometry.

This alternative addresses key non-standard conditions identified in **Chapter 3**. The existing Runway 13/31 creates direct conflicts with Runway 14/32, including intrusions into the Runway 14/32 RSA and

ROFA. These conflicts represent fundamental geometry constraints that cannot be fully mitigated through design modifications. In addition, the intersection of Runways 13/31 and 14/32 contributes to complex hold line configurations and runway incursion mitigation concerns. Removing Runway 13/31 eliminates these issues and simplifies the airfield configuration.

Previous analyses indicate that Runway 13/31 primarily serves smaller aircraft and does not meet the criteria for a legacy crosswind runway, while Runway 9/27 retains that designation. Wind coverage analysis also demonstrates that Runway 14/32 and Runway 9/27 provide acceptable crosswind coverage. These findings support the operational viability of this alternative.

4.3.4. Runway Alternative D: Closure of Runways 9/27 and 13/31

Alternative D evaluates the closure of both Runway 9/27 and Runway 13/31, retaining Runway 14/32 as the sole operational runway. This results in a single-runway configuration. This alternative provides the greatest increase in developable land, with approximately 98.8 acres within the Airport boundary becoming available for aeronautical use development. This land is made available through the removal of both crosswind runways and their associated safety areas.

Alternative D also provides the most complete mitigation of non-standard conditions identified in Chapter 3. The removal of Runway 13/31 eliminates RSA and ROFA intrusions and intersecting runway geometry affecting Runway 14/32. The removal of Runway 9/27 resolves localized issues, including the vehicle service road within the Runway 9 RSA and associated ROFA and TOFA conflicts.

However, this alternative introduces operational limitations. The removal of both crosswind runways eliminates all dedicated crosswind capability. While Runway 14/32 provides a high level of wind coverage, this configuration reduces operational flexibility for smaller aircraft and may limit operations during certain wind conditions. In addition, all activities are consolidated onto a single runway, reducing system redundancy. As a result, Alternative D maximizes development potential and standards compliance but does so at the expense of operational flexibility and resilience.

4.3.5. Runway Alternatives Evaluation

The runway closure alternatives described in **Sections 4.3.1** through **4.3.4** were evaluated using the criteria introduced in the previous section. These criteria provide a consistent framework for comparing alternatives based on their ability to address existing airfield deficiencies, maintain operational capability, improve resiliency under floodwall conditions, and support long-term development within the Airport boundary.

Alternative A (All Runways Open) performs well from an operational standpoint, as it preserves the full three-runway configuration and maintains maximum flexibility for aircraft operations. However, it does not address the non-standard conditions identified in the Facility Requirements chapter and provides limited opportunity for additional development. As a result, this alternative primarily serves as a baseline for comparison rather than a long-term solution.

Alternative B (Runway 9/27 Closure) provides a moderate increase in available development area and resolves several localized non-standard conditions associated with the Runway 9/27 corridor, including conflicts within safety areas and adjacent taxiway separation issues. However, this alternative does not address the more significant airfield geometry conflicts associated with the interaction between

Runways 13/31 and 14/32. Additionally, between Runways 9/27 and 13/31, Runway 9/27 has future financial support from FAA funding sources when rehabilitation/reconstruction is required. As a result, while it improves certain aspects of the airfield, it does not fully resolve the primary design and safety concerns identified in **Chapter 3** and may have higher cost-to-implement implications than closing Runway 13/31.

Alternative C (Runway 13/31 Closure) achieves the highest overall performance across the evaluation criteria. This alternative directly addresses the most critical non-standard conditions by removing conflicts between Runway 13/31 and Runway 14/32, including intrusions into the RSA and ROFA, as well as intersections that contribute to operational complexity and runway incursion mitigation concerns. At the same time, Alternative C maintains an operational crosswind runway (Runway 9/27), preserving sufficient flexibility to accommodate the Airport's fleet mix and wind conditions. This alternative also provides a meaningful increase in developable land while avoiding the operational limitations associated with a single-runway configuration.

Alternative D (Closure of Runways 9/27 and 13/31) provides the greatest increase in developable land and fully eliminates the majority of non-standard conditions across the airfield. However, this alternative consolidates all operations onto a single runway and eliminates dedicated crosswind capability. While the primary runway provides a high level of wind coverage, this configuration reduces operational flexibility and introduces potential limitations during certain wind conditions, particularly for smaller aircraft. It also reduces system redundancy and concentrates all activity on a single facility.

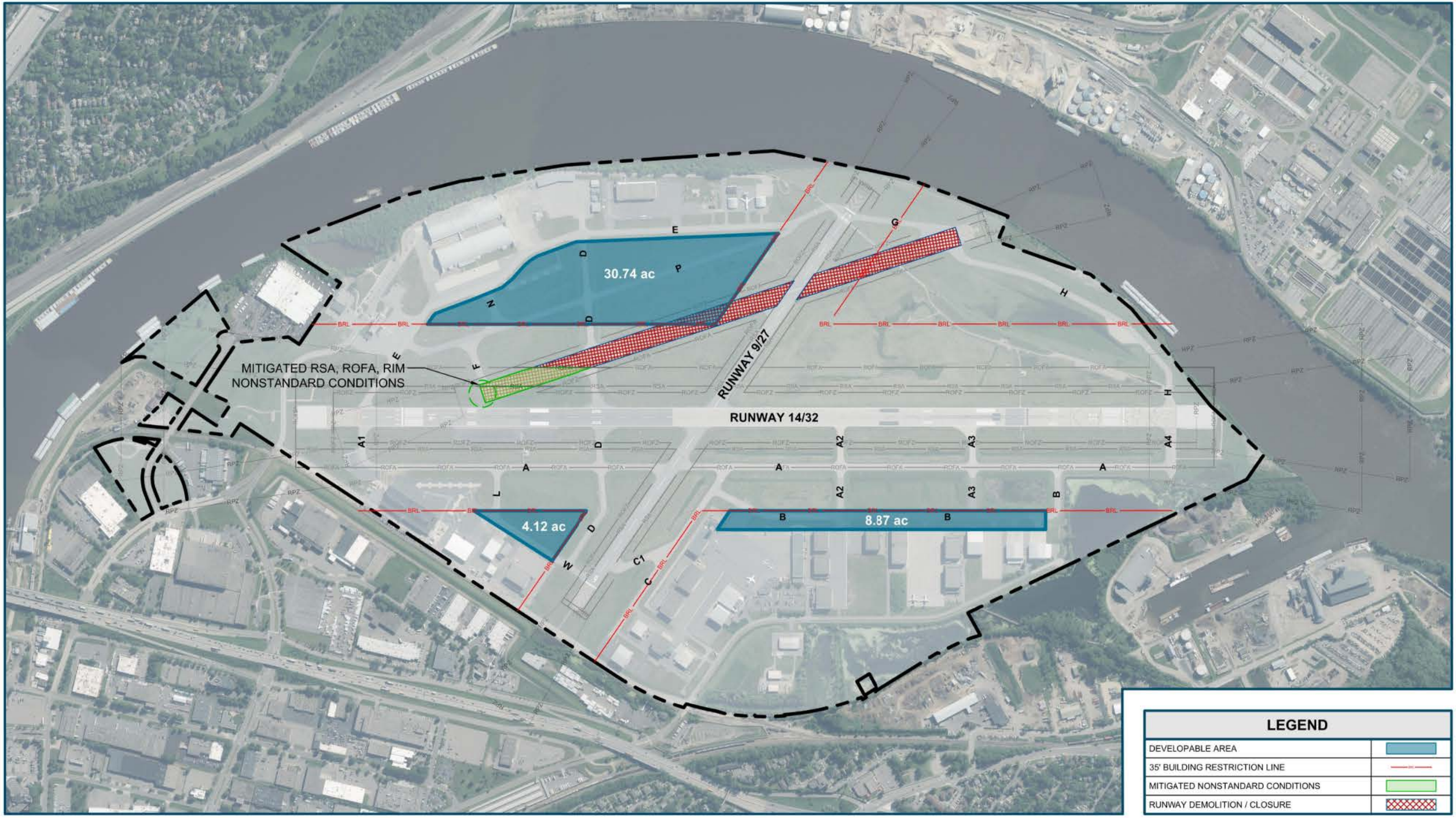
Based on this evaluation, Alternative C represents the most balanced approach to addressing the Airport's long-term needs as shown in **Table 4.1**. It resolves the most critical airfield design deficiencies, maintains operational capability, improves compatibility with floodwall conditions, and provides additional land for future aeronautical development. Accordingly, Alternative C, represented in **Figure 4.1**, is identified as the preferred runway configuration and will be carried forward for further refinement in subsequent sections of this chapter.

Table 4.1 - Evaluation of Runway Alternatives

Runway Alternative	Airfield Safety & Design Compliance	Operational Capability & Flexibility	Floodwall Compatibility & Resiliency	Development Potential & Land Use Efficiency	Implementation Feasibility & Cost	Total Score
A – All Open	0	3	2	0	1	**6**
B – 9/27 Closure	1	1	2	2	1	**7**
C – 13/31 Closure	2	2	2	2	2	**10**
D – 9/27 & 13/31 Closure	3	0	2	3	1	**9**

Sources:
Kimley-Horn, 2026.

Scoring Legend:
0 = Does not satisfy evaluation criteria
1 = Provides some benefit, but short of fully satisfying evaluation criteria
2 = Satisfies evaluation criteria with minor challenges
3 = Satisfies evaluation criteria or no negative impact



LEGEND	
DEVELOPABLE AREA	
35' BUILDING RESTRICTION LINE	
MITIGATED NONSTANDARD CONDITIONS	
RUNWAY DEMOLITION / CLOSURE	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 350 700 1400
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.1 OCTOBER 2026

PREFERRED RUNWAY LAYOUT ALTERNATIVE C:
RUNWAY 13/31 CLOSURE

4.4. Runway End Alternatives

Runway 14/32 presents a distinct set of planning considerations compared to other airfield elements, driven by the direct interaction between runway geometry, floodwall infrastructure, and FAA design standards. Unlike broader airfield layout alternatives that focus on resolving combined impacts, improvements to the primary runway must address highly localized constraints that vary significantly between runway ends. At the Runway 14 end, alternatives focus on resolving ROFA-related non-standard conditions within an established footprint, while at the Runway 32 end, alternatives must consider compatibility with the uniquely constrained floodwall configuration, safety area requirements, and instrument approach surfaces. As a result, the alternatives presented in this section evaluate targeted strategies to improve standards compliance, maintain operational performance, and enhance resiliency under both floodwall-down and floodwall-up conditions.

4.4.1. Runway End 14 Alternatives

Runway end (RE) 14 includes several non-standard conditions within the ROFA that do not meet current FAA design standards. These conditions include airfield infrastructure, roadway features, and fencing located within required safety areas. The objective of the Runway 14 alternatives is to mitigate these non-standard conditions while balancing cost, complexity, operational impacts, and long-term benefit to the Airport.

Two alternatives were developed for the Runway 14 end. The first focuses on mitigating ROFA conflicts primarily through facility relocation and reliance on an FAA Modification of Standards (MOS), while maintaining the existing runway end location. The second mitigates all ROFA conflicts by shifting the runway end to the south. Shortening the runway eliminates the need for an MOS but introduces a reduction in available takeoff distance. Descriptions of each are provided in the following section.

4.4.1.1. RE 14 Alternative A: ROFA Mitigation with MOS

Alternative A takes a mitigation-focused approach that preserves the existing Runway 14 end location while addressing several non-standard conditions within the ROFA. Under this alternative, the existing runway end remains unchanged, resulting in no impact to runway length.

Several objects currently located within the Runway 14 ROFA do not meet FAA design standards. These include the localizer equipment shelter, which also houses the Distance Measuring Equipment (DME) antenna, the associated Vehicle Service Road (VSR), approximately 27 linear feet of fence, approximately 220 linear feet of Airport Road, and an additional 250 linear feet of fence.

To mitigate these conditions, Alternative A proposes relocating the localizer shelter with DME antenna and the associated VSR outside of the ROFA. Portions of Airport Road and the existing fence line would remain in place and would be addressed through the MOS process. An MOS provides FAA-approved relief from certain design standards but must be reevaluated the next time the impacted airfield pavement is reconstructed.

A key advantage of Alternative A, shown in **Figure 4.2**, is that it maintains the existing Runway 14 end location, thereby avoiding any reduction in runway length or changes to aircraft performance. However, this alternative relies on continued FAA approval of an MOS to address remaining ROFA conflicts.

(F) LOCALIZER SHELTER, DME, AND VSR

MODIFICATION OF STANDARDS (MOS) OR RELOCATE
~27 LF OF AOA FENCE

(E) LOCALIZER

MODIFICATION OF STANDARDS (MOS)
~250 LF OF AOA FENCE

MODIFICATION OF STANDARDS (MOS)
~220 LF OF ROADWAY

RPZ

ROFA

RSA

14

31

LEGEND	
EXISTING RUNWAY SAFETY AREA (RSA)	RSA
EXISTING RUNWAY OBJECT FREE AREA (ROFA)	ROFA
EXISTING RUNWAY PROTECTION ZONE (RPZ)	RPZ
REQUIRES MODIFICATION OF STANDARDS (MOS)	
EXISTING EMAS	
FUTURE DEMOLITION	
EXISTING AOA FENCE	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 75 150 300
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.2 OCTOBER 2026

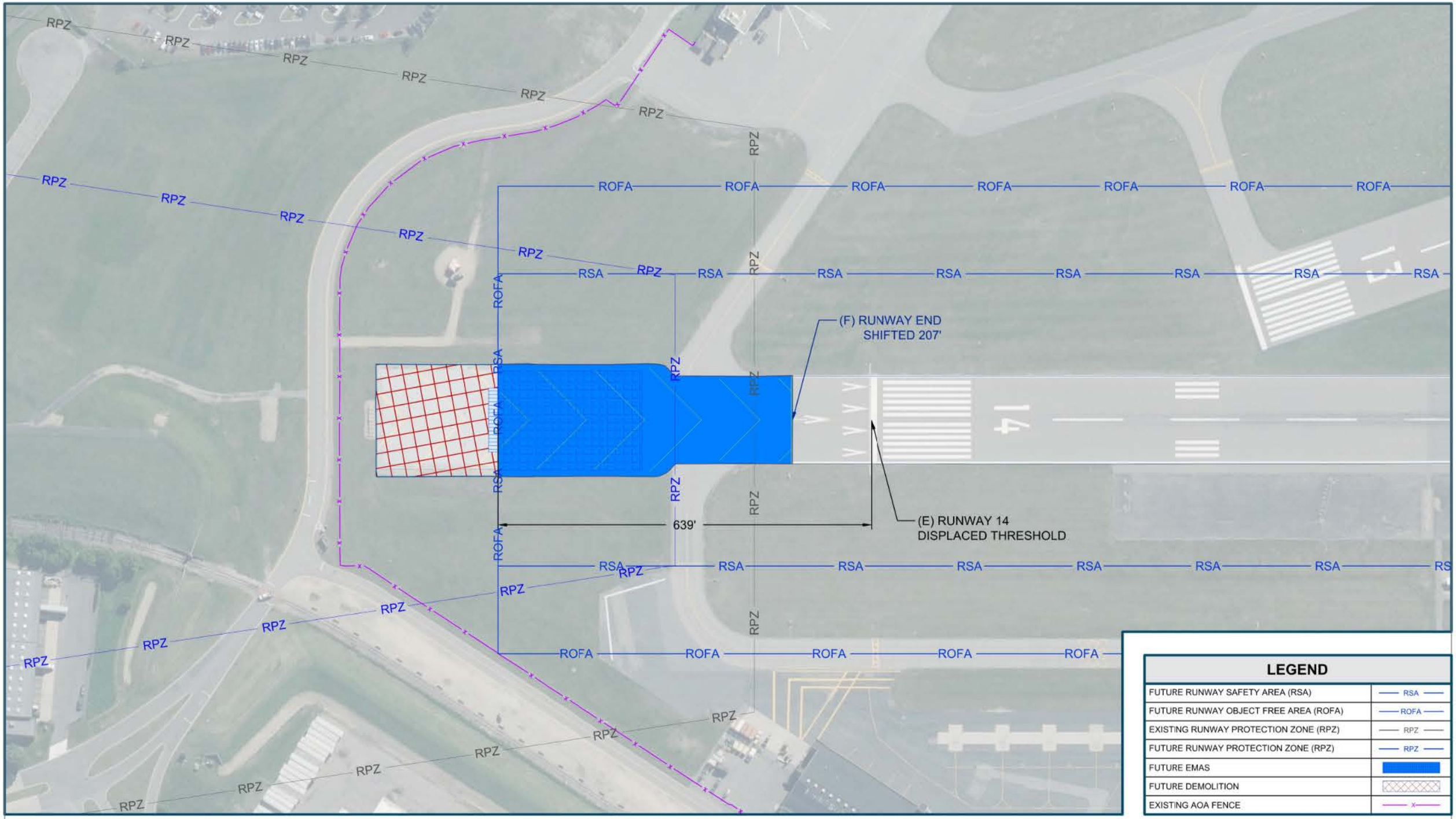
RUNWAY END 14 ALTERNATIVE A:
ROFA MITIGATION WITH MOS

4.4.1.2. RE 14 Alternative B: ROFA Mitigation with Runway End Shift

Alternative B mitigates ROFA conflicts through a different approach by shifting the Runway 14 end inward by approximately 207 feet. Unlike Alternative A, this concept fully eliminates non-standard conditions within the ROFA and does not rely on an MOS. Under this alternative, shifting the runway end requires the relocation of the Engineered Materials Arresting System (EMAS) bed, connector taxiways, and associated navigational aids (NAVAIDs) as depicted in **Figure 4.3**. The runway end shift is sized to ensure that Airport Road is fully located outside of the ROFA, resolving all ROFA conflicts through geometric compliance.

The existing Runway 14 landing threshold remains unchanged, resulting in no loss of landing distance available (LDA) for aircraft arriving on Runway 14. However, the takeoff distance available (TODA) for southbound departures would be reduced by approximately 207 feet.

A key advantage of Alternative B is that it fully mitigates all ROFA deficiencies without the need for an MOS, providing a permanent, standards-compliant solution. This benefit must be weighed against the operational impact associated with the reduction in available takeoff distance.



LEGEND	
FUTURE RUNWAY SAFETY AREA (RSA)	RSA
FUTURE RUNWAY OBJECT FREE AREA (ROFA)	ROFA
EXISTING RUNWAY PROTECTION ZONE (RPZ)	RPZ
FUTURE RUNWAY PROTECTION ZONE (RPZ)	RPZ
FUTURE EMAS	
FUTURE DEMOLITION	
EXISTING AOA FENCE	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 75 150 300
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.3 OCTOBER 2026

RUNWAY END 14 ALTERNATIVE B: ROFA MITIGATION WITH RUNWAY END SHIFT

4.4.1.3. Runway End 14 Alternatives Evaluation

The Runway 14 end alternatives were evaluated using the criteria established in **Section 4.2**. Alternative A (ROFA Mitigation with MOS) performs strongly across most criteria. From a safety and design compliance perspective, this alternative provides a meaningful improvement by relocating key objects outside of the ROFA, while addressing the remaining conflicts through an MOS. Although reliance on an MOS does not represent full design compliance, this approach is commonly used and effectively mitigates the identified deficiencies, resulting in a moderate-to-high score for this criterion.

Operationally, Alternative A maintains the existing Runway 14 end location and preserves all available runway length and declared distances. This ensures that aircraft performance is unaffected and that the runway continues to support existing and future operations without restriction. As a result, this alternative scores highly for operational capability and flexibility.

Alternative A also performs well with respect to floodwall compatibility and resiliency. Because the runway geometry remains unchanged, this alternative avoids introducing additional constraints during floodwall deployment conditions and maintains consistency between standard and floodwall configurations. This minimizes operational disruption and complexity during transitional conditions.

From an implementation standpoint, Alternative A is the most feasible and cost-effective option. Required improvements are limited to targeted relocations of specific facilities, avoiding more extensive reconstruction of runway infrastructure, navigational aids, or taxiways. This results in fewer construction impacts and more straightforward implementation. In contrast, Alternative B (ROFA Mitigation with Runway End Shift) achieves full compliance with FAA design standards by eliminating all ROFA deficiencies without reliance on an MOS. This represents the strongest performance under the safety and design compliance criterion. However, this benefit must be weighed against several drawbacks.

Most notably, shifting the runway end reduces the available takeoff distance for Runway 14 departures. While the reduction is relatively modest, it introduces a permanent operational restriction that does not exist under Alternative A. This results in a lower score for operational capability and flexibility. In addition, Alternative B requires substantial capital improvements including airfield modifications, relocation of the Engineered Materials Arresting System (EMAS), taxiways, and navigational aids. These changes increase the complexity, cost, and constructability challenges associated with implementation. This alternative also requires more extensive coordination with regulatory agencies to ensure normal operations are maintained during construction.

While Alternative B provides a permanent, standards-compliant solution, the added complexity, cost, and operational restrictions reduce its overall effectiveness relative to Alternative A as shown in **Table 4.2**. Based on these reasons, Alternative A (ROFA Mitigation with MOS) is recommended as the preferred concept for the Runway 14 end.

Table 4.2 - Evaluation of Runway End 14 Alternatives

Runway End 14 Alternative	Airfield Safety & Design Compliance	Operational Capability & Flexibility	Floodwall Compatibility & Resiliency	Development Potential & Land Use Efficiency	Implementation Feasibility & Cost	Total Score
A – Mitigation with MOS	2	3	3	3	3	**14**
B – Shift Runway End	3	2	3	3	1	**12**

Sources:
Kimley-Horn, 2026.

Scoring Legend:
0 = Does not satisfy evaluation criteria
1 = Provides some benefit, but short of fully satisfying evaluation criteria
2 = Satisfies evaluation criteria with minor challenges
3 = Satisfies evaluation criteria or no negative impact

4.4.2. Runway End 32 Alternatives

Development of a long-term, sustainable solution for the Runway 32 end is one of the core priorities of the Long-Term Plan. This runway end is uniquely constrained by its proximity to the Mississippi River and by the interaction between flood protection infrastructure, airfield safety standards, and instrument approach requirements.

As part of this planning effort, the project team initially evaluated whether physical modifications within the river corridor could provide opportunities to increase allowable usable runway length beyond existing conditions. However, surface water modeling conducted as part of the floodwall analysis determined that any encroachment into the river would result in upstream impacts beyond allowable limits. As a result, alternatives involving riverward expansion or structural modification were eliminated from further consideration. Given this constraint, the focus of the Runway 32 alternatives shifted from increasing runway length to eliminating non-standard conditions that cannot be addressed through an MOS and maximizing runway functionality under both floodwall-down and floodwall-up operating conditions, while avoiding impacts to the river corridor.

Under existing and floodwall-down conditions, several critical challenges are present at the Runway 32 end. The RSA and ROFA extend into the river and beyond airport property, resulting in non-standard conditions. While ROFA deficiencies may be addressed through an MOS, RSA standards cannot be mitigated through an MOS and therefore represent a fundamental compliance issue. In addition, protected areas associated with the glideslope and localizer, which are components of the Instrument Landing System (ILS), further constrain available space at the runway end. The existing EMAS mitigates some of these conditions but does not fully resolve all non-standard elements.

When the temporary floodwall is deployed, additional operational impacts occur. The ILS becomes inoperable, and the temporary floodwall structure penetrates the ROFA. While an MOS is currently in place for these conditions, it does not represent a permanent or long-term solution. Most significantly, under existing floodwall-up conditions, the usable length of Runway 14/32 is reduced by nearly 1,200 feet.

Given these constraints and operational impacts, the Runway 32 floodwall alternatives were developed to focus on concepts that:

- Preserve usable runway length to the greatest extent practicable
- Maximize primary runway usability under both floodwall-down and floodwall-up conditions
- Avoid impacts to the river corridor

Based on these objectives, the viable alternatives for Runway 32 end focus on maximizing usable runway length within the existing airport footprint, while improving compliance with FAA design standards and reducing reliance on long-term MOS conditions. The three alternatives that emerged as viable are described below.

4.4.2.1. RE 32 Alternative C: Temporary Floodwall Realignment

Alternative C proposes a temporary floodwall system that would be deployed only during flood events and removed under normal operating conditions. The proposed floodwall has a uniform height of approximately 9 feet above ground level, corresponding to an elevation of approximately 713 feet above mean sea level (MSL) along the extended Runway 32 centerline. This height was established through coordination with the MAC and flood modeling analyses and provides flood protection exceeding the 100-year flood event. Both temporary and permanent floodwall concepts evaluated in this chapter assume this same floodwall height.

Under Alternative C, the floodwall alignment closely follows the existing temporary flood protection system before wrapping around the ROFA at the Runway 32 end. Avoidance of ROFA impacts was a key design constraint and is maintained in this alternative. The alignment allows the floodwall to enclose the EMAS, localizer, localizer critical area, localizer shelter, and VSR within the protected area while maximizing available runway length.

Several airfield modifications would be required under this alternative regardless of operating condition. The EMAS bed and associated connector taxiway would be relocated to accommodate the floodwall alignment and ROFA constraints. These changes are required to maintain safety area compliance while preserving the maximum practicable runway length. Implementation of Alternative C would result in a 390-foot reduction in length for Runway 14/32, yielding a revised runway length of 6,101 feet.

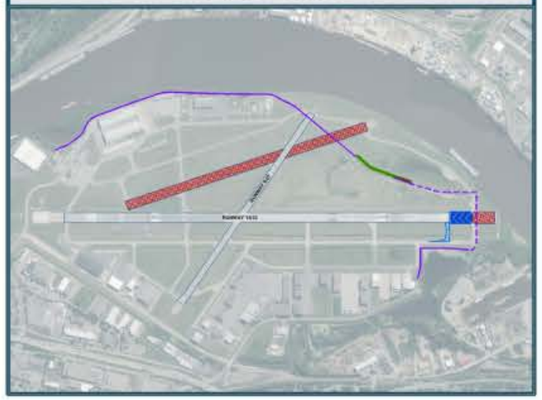
Because the proposed floodwall is temporary, Alternative C is evaluated under two operating configurations: floodwall down, representing normal day-to-day airport operations, and floodwall up, representing conditions when the floodwall is erected in response to flooding. The following sections describe Alternative C under each operating configuration and identify their associated airfield and operational impacts.

Floodwall Down

In the floodwall-down configuration (depicted in **Figure 4.4**), Runway 32 operates under normal conditions when the temporary floodwall is not deployed. To maintain glideslope performance in this configuration, a new alignment is proposed for temporary floodwall segment near the glideslope critical area and the Runway 32 threshold. In addition, portions of the existing berm west of the Runway 32 end would be regraded to prevent penetration of the glideslope critical area.

These improvements allow the precision instrument approach to remain operational during normal conditions while maintaining the proposed floodwall alignment and height. In the floodwall-down configuration, Runway 14/32 would provide a usable runway length of 6,101 feet, reflecting the 390-foot reduction associated with Alternative C.

INSET MAP



LEGEND

FUTURE RUNWAY SAFETY AREA (RSA)	RSA
FUTURE RUNWAY OBJECT FREE AREA (ROFA)	ROFA
FUTURE PART 77 APPROACH SURFACE	(F) P77 APP
FUTURE RUNWAY MARKINGS	
FUTURE EMAS	
FUTURE DEMOLITION	
FUTURE FLOODWALL (PERMANENT / TEMPORARY)	/
EXISTING FLOODWALL (PERMANENT / TEMPORARY)	/
FUTURE LOCALIZER CRITICAL AREA	
GLIDE SLOPE CRITICAL AREA	

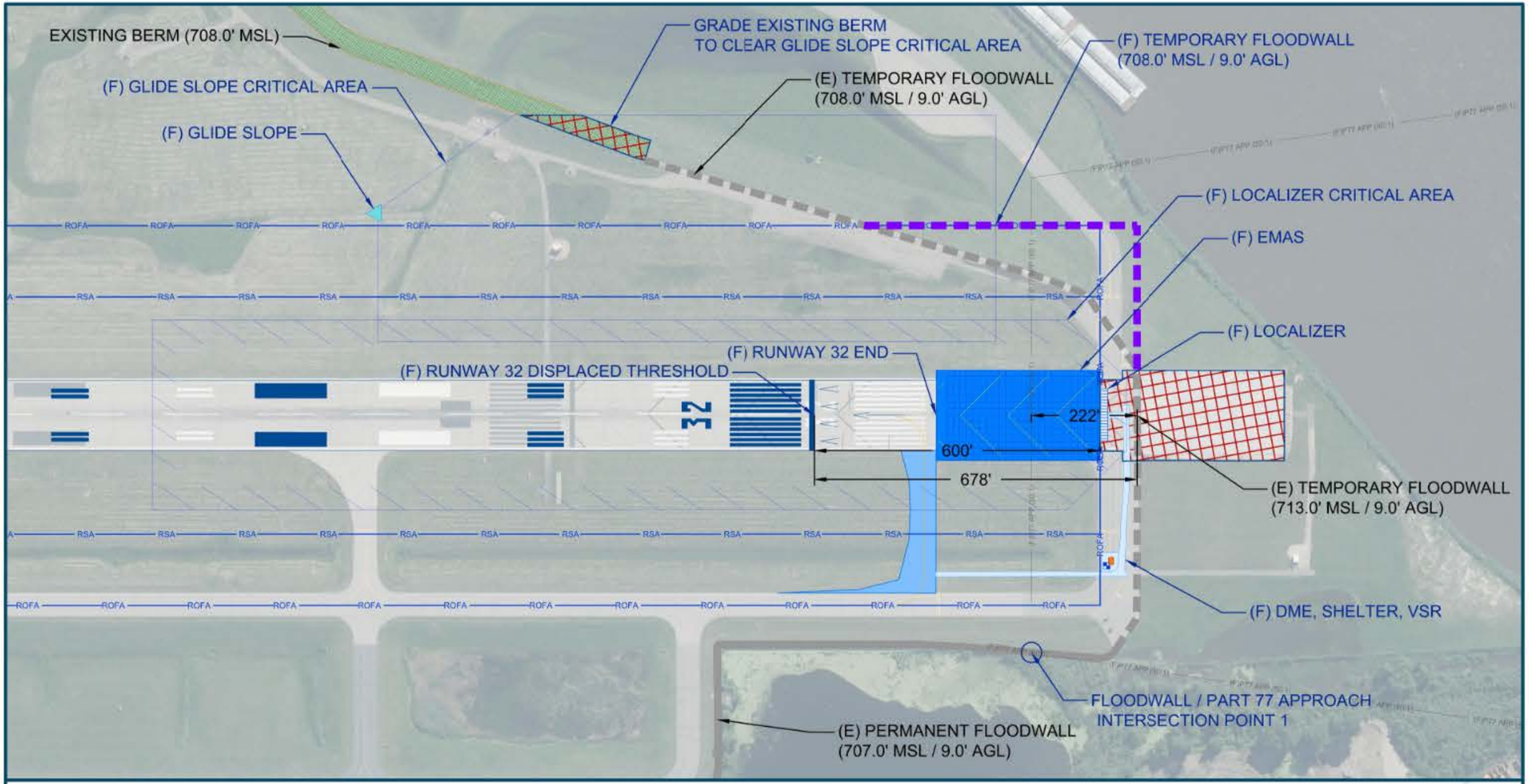
DECLARED DISTANCES

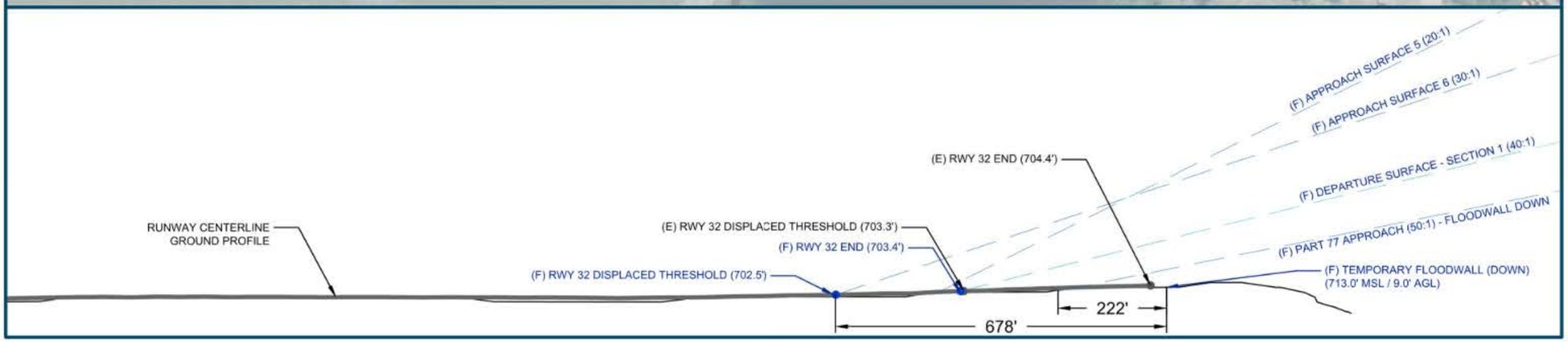
	DT	TORA	TODA	ASDA	LDA
RUNWAY 14	343'	6,101'	6,101'	6,101'	5,758'
LENGTH GAIN / LOSS	0'	-390'	-390'	-390'	-390'
RUNWAY 32	256'	6,101'	6,101'	6,101'	5,845'
LENGTH GAIN / LOSS	-126'	-390'	-390'	-390'	-264'

NOTES:
RUNWAY LENGTH GAIN OR LOSS RELATIVE TO EXISTING CONDITIONS WHEN THE TEMPORARY FLOODWALL IS NOT DEPLOYED.

PROFILE VIEW
VERTICAL SCALE (in ft.)

25
12.5
0





STP

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 125 250 500
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.4 OCTOBER 2026

RUNWAY END 32 ALTERNATIVE C: TEMPORARY FLOODWALL REALIGNMENT (FLOODWALL DOWN)

Floodwall Up

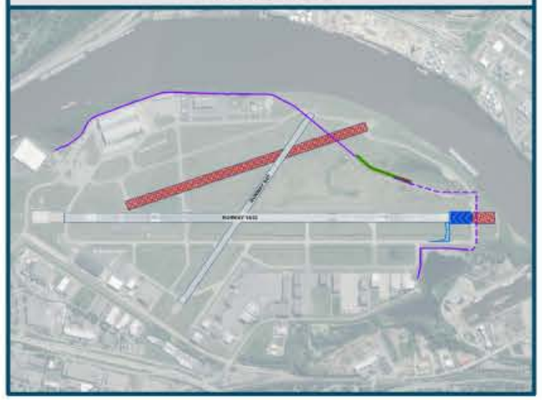
The floodwall-up configuration (depicted in **Figure 4.5**) illustrates airfield and airspace impacts when the temporary floodwall is deployed in response to flooding. From a runway geometry standpoint, there is no change in usable runway length when the floodwall is erected. Runway 14/32 would continue to provide 6,101 feet of available runway length, consistent with floodwall-down conditions.

The primary impacts under floodwall-up conditions are related to airspace and instrument approach operations. In this configuration, a portion of the temporary floodwall penetrates the glideslope critical area for Runway 32. As a result, the ILS approach would be inoperable while the floodwall is deployed.

Because the 50:1 Part 77 approach surface applies to the precision ILS approach, which would not be available during floodwall-up conditions, a 34:1 approach surface would apply for non-precision operations. Under this scenario, the floodwall penetrates the 34:1 approach surface at three locations: along the extended runway centerline and on both sides of the runway. In addition, the localizer shelter/DME and antenna array remain as penetrations to the applicable approach surface. One point along the temporary floodwall would also penetrate the applicable Part 77 approach surface, requiring obstruction lighting while the floodwall is in place.

During floodwall-up conditions, Runway 32 operations would therefore be limited to a non-precision lateral navigation/vertical navigation (LNAV/VNAV) approach, rather than a precision ILS. While runway length and pavement availability are preserved, the key tradeoff associated with floodwall deployment is a temporary reduction in approach capability until the floodwall is removed and normal conditions are restored.

INSET MAP



LEGEND

FUTURE RUNWAY SAFETY AREA (RSA)	RSA
FUTURE RUNWAY OBJECT FREE AREA (ROFA)	ROFA
FUTURE PART 77 APPROACH SURFACE	(F) P77 APP
FUTURE RUNWAY MARKINGS	
FUTURE EMAS	
FUTURE DEMOLITION	
FUTURE FLOODWALL (PERMANENT / TEMPORARY)	/
EXISTING FLOODWALL (PERMANENT / TEMPORARY)	/
FUTURE LOCALIZER CRITICAL AREA	
GLIDE SLOPE CRITICAL AREA	

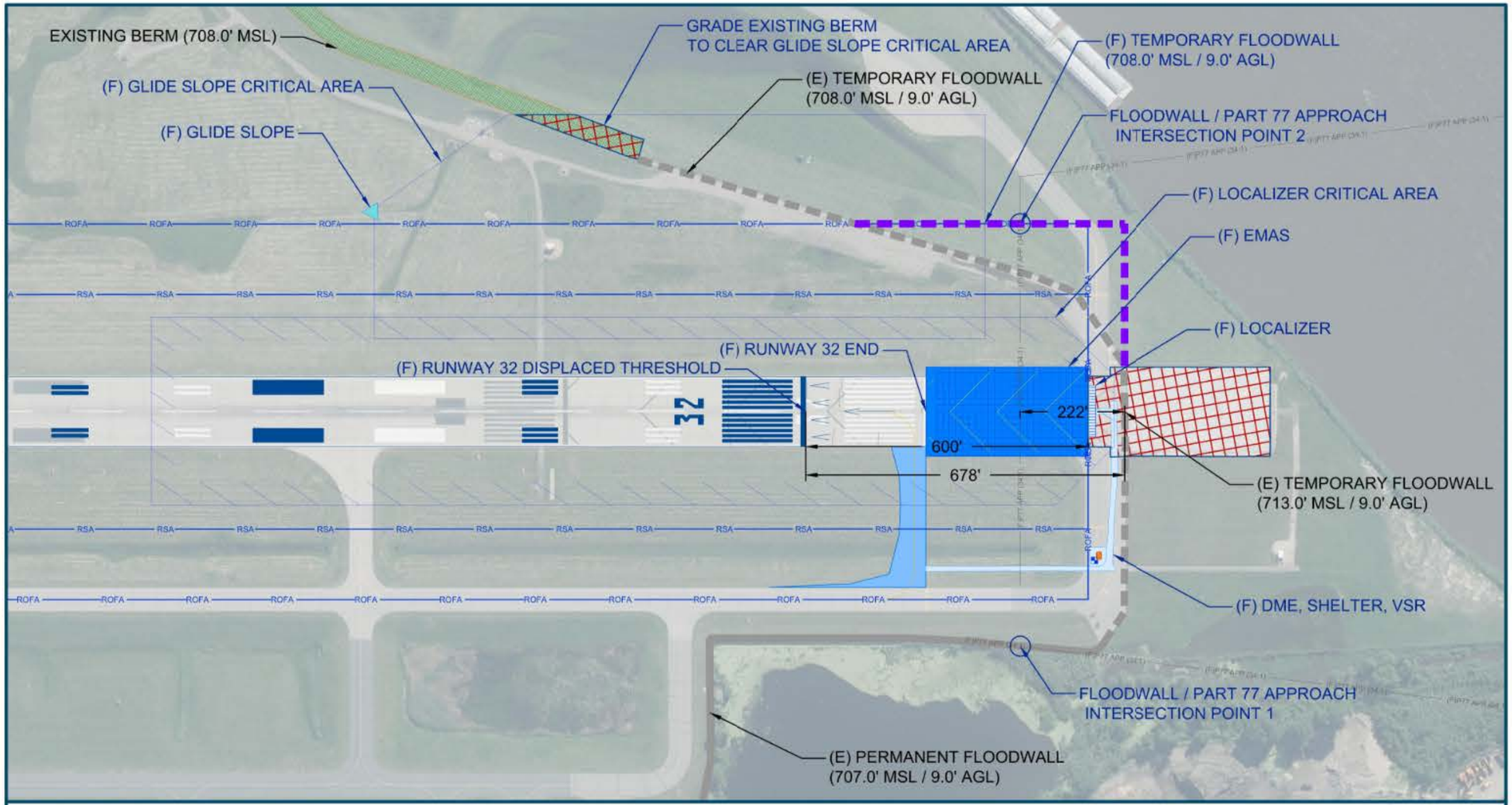
DECLARED DISTANCES - FLOODWALL UP

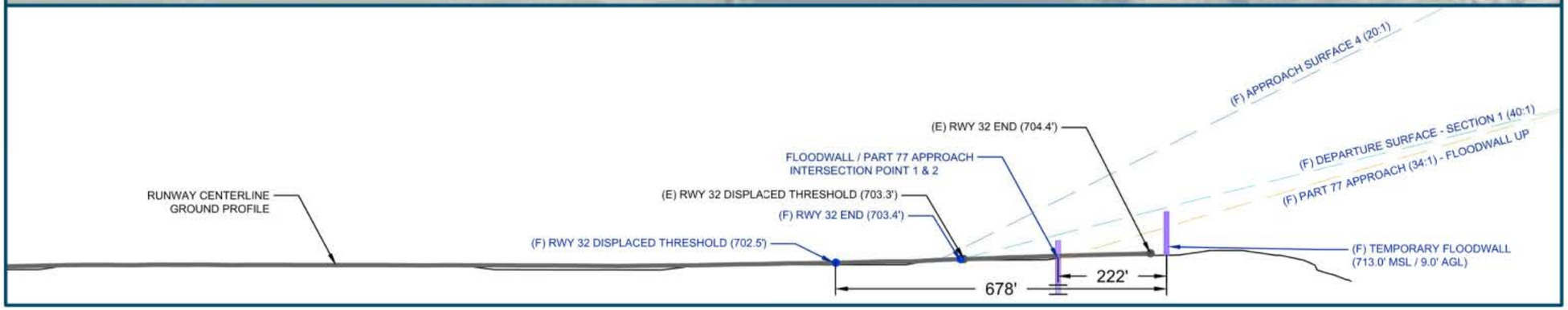
	DT	TORA	TODA	ASDA	LDA
RUNWAY 14	343'	6,101'	6,101'	6,101'	5,758'
LENGTH GAIN / LOSS	0'	+760'	+760'	+760'	+760'
RUNWAY 32	256'	6,101'	6,101'	6,101'	5,845'
LENGTH GAIN / LOSS	-126'	+760'	+760'	+760'	+504'

NOTES:
RUNWAY LENGTH GAIN OR LOSS RELATIVE TO EXISTING CONDITIONS WHEN THE TEMPORARY FLOODWALL IS DEPLOYED.

PROFILE VIEW
VERTICAL SCALE (in ft.)

25
12.5
0





STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 125 250 500
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.5 OCTOBER 2026

RUNWAY END 32 ALTERNATIVE C: TEMPORARY FLOODWALL REALIGNMENT (FLOODWALL UP)

4.4.2.2. RE 32 Alternative D: Permanent Floodwall and Raised Runway Environment

Alternative D builds directly on the concepts evaluated under Alternative C and retains many of the same geometric and operational parameters. The floodwall alignment, relocated pavement elements, and overall usable runway length are consistent with Alternative C, including the resulting 6,101-foot Runway 14/32 length and the relocation of the EMAS bed and associated connector taxiway to accommodate ROFA constraints. As with Alternative C, this alternative maximizes usable runway length within the existing airport footprint and avoids impacts to the river corridor.

The key distinction between Alternative C and Alternative D is that Alternative D assumes a permanent floodwall, rather than a temporary structure. As a result, Runway 14/32 would operate under a single, consistent runway condition, eliminating the need to alternate between floodwall-down and floodwall-up configurations. This approach simplifies both airfield operations and long-term planning by removing conditional operational scenarios associated with temporary floodwall deployment.

Under Alternative D, the proposed permanent floodwall aligns with the existing temporary flood protection system and wraps around the ROFA at the Runway 32 end, consistent with Alternative C. To eliminate floodwall penetrations of protected airspace surfaces, the Runway 32 end and surrounding airfield environment (including the runway end, associated pavement surfaces, connector taxiways, and applicable safety areas) would be raised to an elevation of approximately 712.25 feet above MSL. A supplemental exhibit has been prepared to illustrate the extent of required airfield grading and associated impacts.

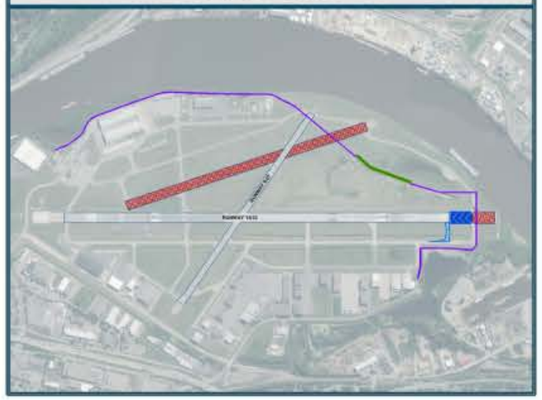
By elevating the runway environment to match the permanent floodwall elevation, Alternative D eliminates all floodwall penetrations of the 50:1 Part 77 approach surface. As a result, no vertical flood protection structures would extend into protected airspace, and the precision instrument approach to Runway 32 would remain fully operable. Unlike the temporary floodwall scenario, this alternative does not require managing differing approach minima or approach availability based on floodwall conditions.

The localizer equipment shelter/DME and localizer antenna array would remain as penetrations to the 50:1 Part 77 approach surface under this alternative, consistent with existing conditions. To maintain full functionality of the ILS instrument approach, it is recommended that the glide slope equipment be raised to match the elevated runway end and surrounding environment. Additional engineering analysis would be required to assess glide slope signal feasibility and to evaluate potential obstructions within the glideslope critical area under this configuration.

All grading and airfield modifications associated with Alternative D would be designed to fully conform with FAA standards for runway and taxiway safety geometry, including RSA, ROFA, and TOFA. While this alternative involves more extensive earthwork and infrastructure modification than Alternative C, it represents a long-term flood protection solution that preserves full runway and instrument approach capability without reliance on temporary operational constraints or long-term MOS.

RE 32 Alternative D represents a concept that maximizes usable runway length within the existing airport footprint, maintains clear airspace surfaces, and preserves full precision approach capability, while providing a permanent and operationally consistent flood protection strategy for the Runway 32 end. This alternative is shown below in **Figure 4.6**.

INSET MAP



LEGEND

FUTURE RUNWAY SAFETY AREA (RSA)	RSA
FUTURE RUNWAY OBJECT FREE AREA (ROFA)	ROFA
FUTURE PART 77 APPROACH SURFACE	(F) P77 APP
FUTURE RUNWAY MARKINGS	
FUTURE EMAS	
FUTURE DEMOLITION	
FUTURE FLOODWALL (PERMANENT / TEMPORARY)	/
EXISTING FLOODWALL (PERMANENT / TEMPORARY)	/
FUTURE LOCALIZER CRITICAL AREA	
GLIDE SLOPE CRITICAL AREA	

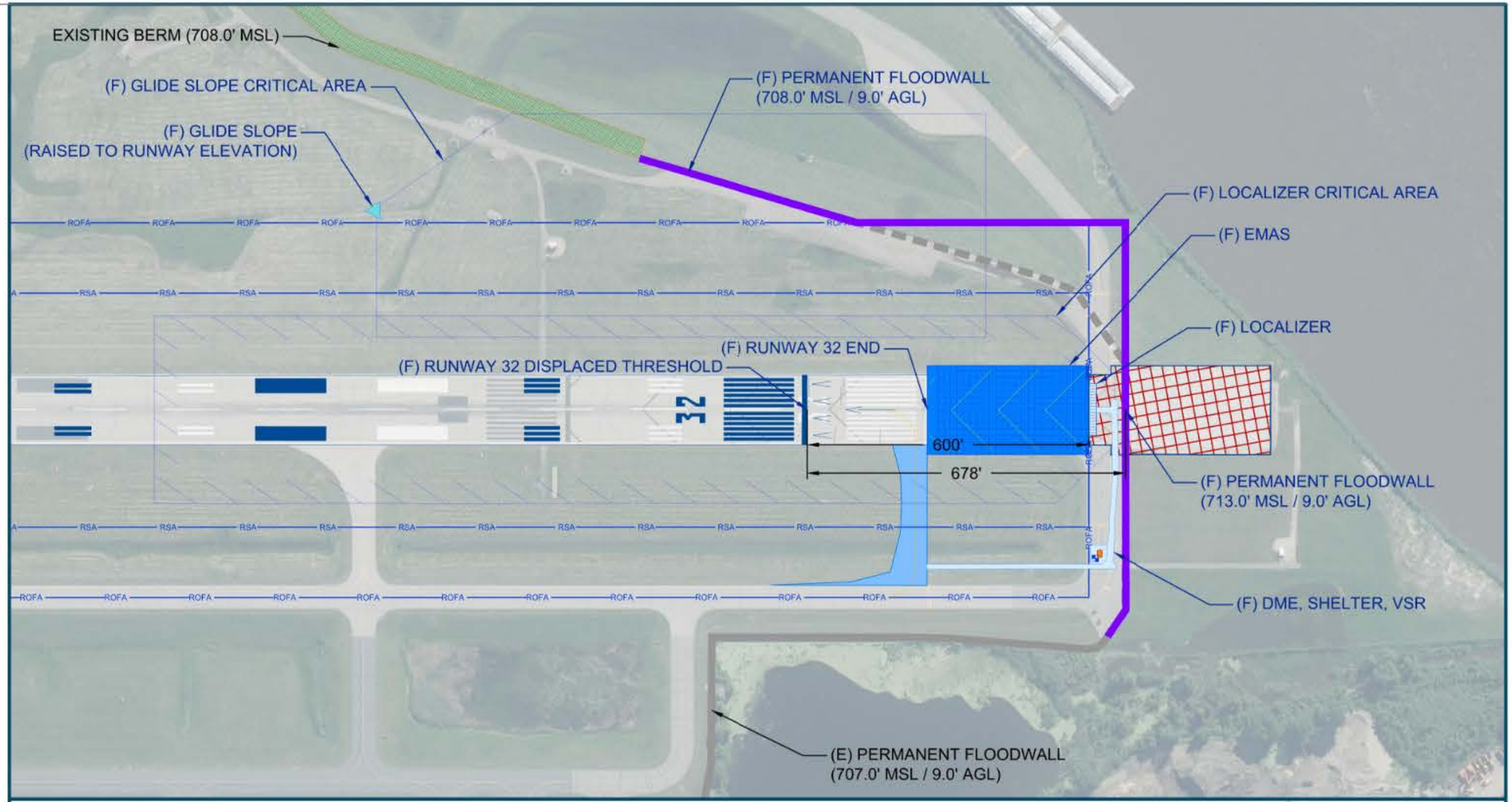
DECLARED DISTANCES

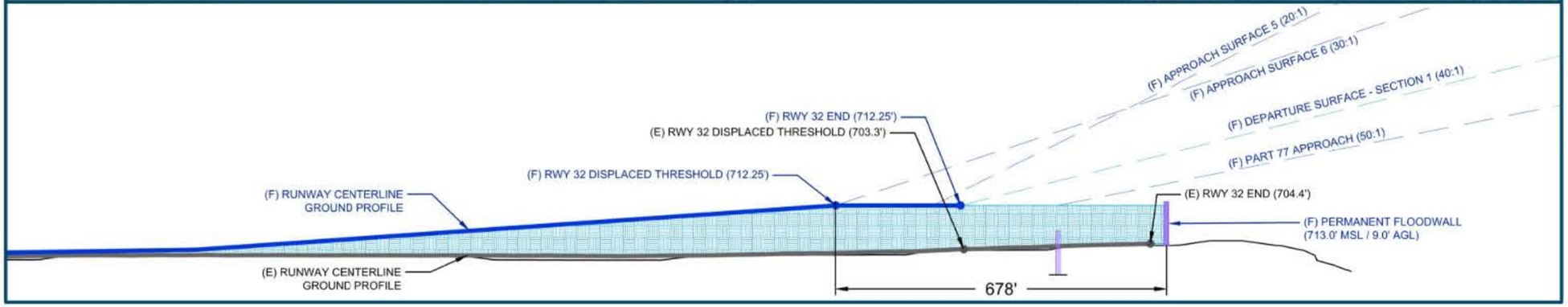
	DT	TORA	TODA	ASDA	LDA
RUNWAY 14	343'	6,101'	6,101'	6,101'	5,758'
LENGTH GAIN / LOSS	0'	-390'	-390'	-390'	-390'
RUNWAY 32	256'	6,101'	6,101'	6,101'	5,845'
LENGTH GAIN / LOSS	-126'	-390'	-390'	-390'	-264'

NOTES:
RUNWAY LENGTH GAIN OR LOSS RELATIVE TO EXISTING CONDITIONS WHEN THE TEMPORARY FLOODWALL IS NOT DEPLOYED.

PROFILE VIEW
VERTICAL SCALE (in ft.)

25
12.5
0





STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 125 250 500
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.6 OCTOBER 2026

RUNWAY END 32 ALTERNATIVE D: PERMANENT FLOODWALL AND RAISED RUNWAY ENVIRONMENT

4.4.2.3. RE 32 Alternative E: Temporary Floodwall Realignment & Declared Distances

Alternative E builds on the concepts evaluated under Alternatives C and D but introduces a hybrid approach that leverages declared distances to standardize safety areas while maximizing operational runway length under both standard and floodwall conditions.

Under this alternative, the proposed floodwall alignment generally follows the existing temporary floodwall configuration before wrapping around the Runway 32 RSA. This alignment is designed to maximize available runway length during floodwall-up conditions while minimizing impacts to the surrounding airfield layout. To support this approach, Alternative E incorporates a 600-foot undershoot RSA at the Runway 32 end, with adjusted declared distances used to maintain compliance with FAA safety area requirements. Alternative E is depicted below in **Figure 4.7**.

One of the primary advantages of this alternative is its ability to preserve existing runway length under standard (floodwall-down) configuration while increasing available runway length in floodwall-up configuration. Compared to existing floodwall conditions, Alternative E provides up to approximately 582 feet of additional usable runway length, improving aircraft performance and operational flexibility during flood events without reducing baseline capacity.

Unlike Alternative C, which avoids ROFA impacts, Alternative E retains a non-standard ROFA due to the presence of both temporary and permanent floodwall elements within the ROFA. In addition, portions of the floodwall are anticipated to penetrate the applicable Part 77 Approach surface. However, no additional airspace penetrations beyond those associated with the floodwall are introduced under this alternative.

Because this alternative relies on declared distances and includes non-standard conditions within the ROFA, implementation will require coordination with the FAA and approval of an MOS. While this alternative includes a regulatory consideration, the approach allows the Airport to balance safety, operational performance, and flood protection within the constraints of the existing airfield footprint.

By leveraging declared distances and a modified floodwall alignment, this alternative maximizes usable runway length in both directions while addressing key safety area considerations within the constraints of the Airport environment.

INSET MAP



LEGEND

FUTURE RUNWAY SAFETY AREA (RSA)	RSA
FUTURE RUNWAY OBJECT FREE AREA (ROFA)	ROFA
FUTURE APPROACH OCS	(F) APP
FUTURE DEPARTURE OCS	(F) DEP
FUTURE PART 77 APPROACH SURFACE	(F) P77 APP
FUTURE RUNWAY MARKINGS	
FUTURE FLOODWALL (PERMANENT / TEMPORARY)	/
EXISTING EMAS	
EXISTING FLOODWALL (PERMANENT / TEMPORARY)	/
EXISTING LOCALIZER CRITICAL AREA	
EXISTING SLOPE CRITICAL AREA	

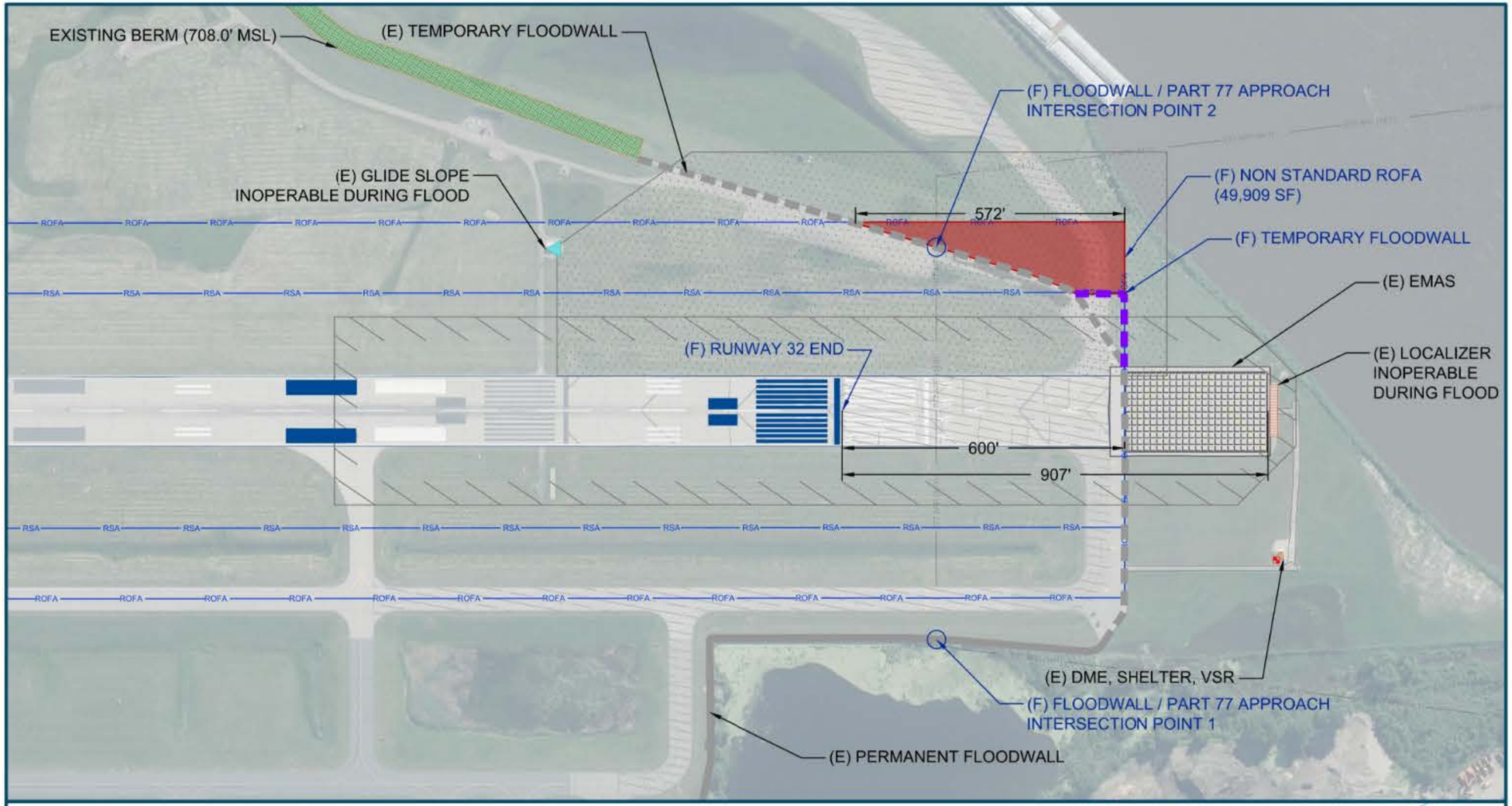
DECLARED DISTANCES - FLOODWALL UP

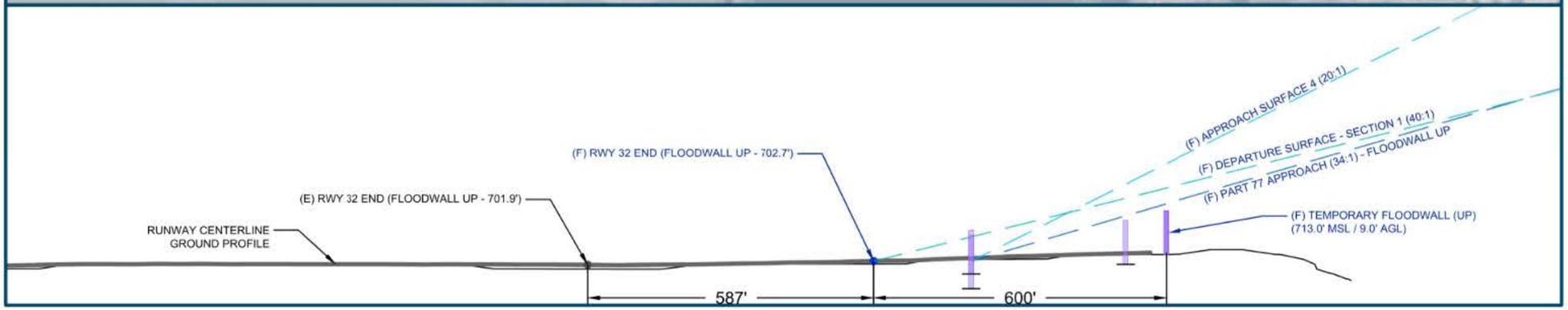
	DT	TORA	TODA	ASDA	LDA
RUNWAY 14	343'	5,923'	5,923'	5,523'	5,173'
LENGTH GAIN / LOSS	0'	+582'	+582'	+182'	+175'
RUNWAY 32	0'	5,923'	5,923'	5,923'	5,923'
LENGTH GAIN / LOSS	0'	+582'	+582'	+582'	+582'

NOTES:
RUNWAY LENGTH GAIN OR LOSS RELATIVE TO EXISTING CONDITIONS WHEN THE TEMPORARY FLOODWALL IS DEPLOYED.

PROFILE VIEW
VERTICAL SCALE (in ft.)

25
12.5
0





STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 125 250 500
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.7 OCTOBER 2026

RUNWAY END 32 ALTERNATIVE E:
TEMPORARY FLOODWALL REALIGNMENT &
DECLARED DISTANCES

4.4.2.4. Runway End 32 Alternatives Evaluation

The evaluation highlights meaningful tradeoffs between maintaining existing runway performance, improving floodwall compatibility, and achieving full compliance with FAA design standards. Alternative E (Declared Distances with Floodwall Alignment) achieves the highest overall performance and is identified as the preferred alternative. This alternative provides a balanced approach by maintaining existing runway length under standard conditions while significantly improving operational performance under floodwall-up conditions. By leveraging declared distances and incorporating a 600-foot undershoot RSA, Alternative E standardizes safety areas while maximizing usable runway length in both directions. Compared to existing floodwall conditions, this approach provides a substantial increase in available runway length, improving aircraft performance and operational flexibility during flood events.

While Alternative E retains non-standard conditions within the ROFA and may require a MOS, these constraints are offset by the operational benefits achieved. The alternative avoids reductions in runway length under standard conditions and does not require extensive airfield reconstruction. In addition, the proposed floodwall alignment closely follows the existing system, minimizing the extent of modifications required and improving compatibility with current flood mitigation practices. Overall, Alternative E best balances safety considerations, operational capability, flood resilience, and implementation feasibility.

Alternative C (Temporary Floodwall Realignment) improves flood protection and avoids ROFA impacts while maintaining a consistent runway length under both floodwall-down and floodwall-up conditions. However, it requires a permanent reduction in overall runway length relative to existing conditions and limits approach capability during floodwall deployment due to airspace penetrations. While Alternative C avoids reliance on long-term non-standard conditions within the ROFA, the reduction in available runway length and operational constraints associated with floodwall deployment reduce its overall effectiveness compared to Alternative E.

Alternative D (Permanent Floodwall and Raised Runway Environment) provides the highest level of design standard compliance by fully eliminating ROFA and airspace penetrations and maintaining full precision approach capability under all conditions. However, this alternative requires substantial reconstruction of the runway environment, including raising pavement elevations, relocating infrastructure, and modifying navigational systems. These improvements introduce significant complexity, cost, and implementation challenges. While Alternative D offers a long-term, standards-compliant solution, the extent of required modifications and associated impacts reduce its feasibility relative to the other alternatives.

Based on this evaluation, Alternative E represents the most balanced and implementable approach for the Runway 32 end as shown in **Table 4.3**. It maximizes operational benefits under both standard and floodwall conditions, provides meaningful improvements in runway usability during flood events, and avoids the complexity and cost associated with more intensive reconstruction alternatives. Accordingly, Alternative E is recommended for further refinement and advancement.

Table 4.3 - Evaluation of Runway End 32 Alternatives

Runway 32 Alternative	Airfield Safety & Design Compliance	Operational Capability & Flexibility	Floodwall Compatibility & Resiliency	Development Potential & Land Use Efficiency	Implementation Feasibility & Cost	Total Score
C – Temporary Floodwall Realignment	3	2	2	1	2	**10**
D – Permanent Floodwall & Raised Runway	3	3	3	1	0	**10**
E – Temporary Floodwall Realignment & Declared Distances	2	3	3	1	3	**12**

Sources:
Kimley-Horn, 2026.

Scoring Legend:
0 = Does not satisfy evaluation criteria
1 = Provides some benefit, but short of fully satisfying evaluation criteria
2 = Satisfies evaluation criteria with minor challenges
3 = Satisfies evaluation criteria or no negative impact

4.4.3. Runway End 9 Alternatives

4.4.3.1. RE 9 Alternative F: VSR Removal

As discussed in Chapter 3, a VSR currently provides direct access to Runway 9 within both the ROFA and RSA. FAA design standards require RSAs to be maintained free of objects and non-essential uses, except those required for their aeronautical function (14 CFR §139.309(b)(4)). Advisory Circular (AC) 150/5300-13B further states that RSAs must be cleared, graded, and free of objects, while only accommodating the occasional passage of emergency and maintenance vehicles. The presence of a dedicated VSR within the RSA and ROFA therefore introduces a continuous, non-essential use within these protected surfaces and is inconsistent with FAA design standards. Such configurations are typically limited to constrained airports and require FAA approval through an MOS, along with operational controls to mitigate runway incursion risk.

The existing VSR represents a non-standard condition because its permanent configuration institutionalizes routine vehicle activity within protected runway areas, contrary to FAA runway incursion prevention principles, even if usage is limited to snow removal equipment (SRE) or construction equipment. This access is not operationally necessary, as the same area can be reached via the existing gate and airfield circulation route from Airport Road through Gate D, Taxilane Sanborn, and Taxilane Cedar/Taxiway W. Based on this redundancy, Alternative F proposes the removal of the VSR, rather than relocation, and is the preferred alternative to restore compliance and eliminate unnecessary operational risk. This removal is depicted on the Airport Layout Plan (ALP) that accompanies this LTP.

4.5. Taxiway Alternatives

This section evaluates a series of taxiway alternatives developed to support the preferred runway configuration and to improve overall airfield circulation, safety, and standards compliance. The removal of Runway 13/31 and its associated taxiway system introduce both operational challenges and opportunities to reconfigure the taxiway network to better align with current and future needs.

The alternatives presented focus on enhancing connectivity to Runway 14/32, improving taxiway geometry and runway access points, and addressing identified non-standard conditions. Collectively, these concepts are intended to reduce runway occupancy time, improve pilot situational awareness, mitigate runway incursion risks, and support efficient access to existing and planned development areas across the airfield.

4.5.1. Taxiway Alternative A: Full Length Runway 14/32 East Side Parallel Taxiway

This alternative proposes the development of a full-length parallel taxiway along the east side of Runway 14/32. The addition of a full-length parallel taxiway on both sides of the primary runway provides significant operational benefits for the Airport, particularly given that general aviation development areas are located on both the east and west sides. This configuration improves aircraft circulation, reduces back-taxiing requirements, and enhances overall operational efficiency during both arrival and departure operations.

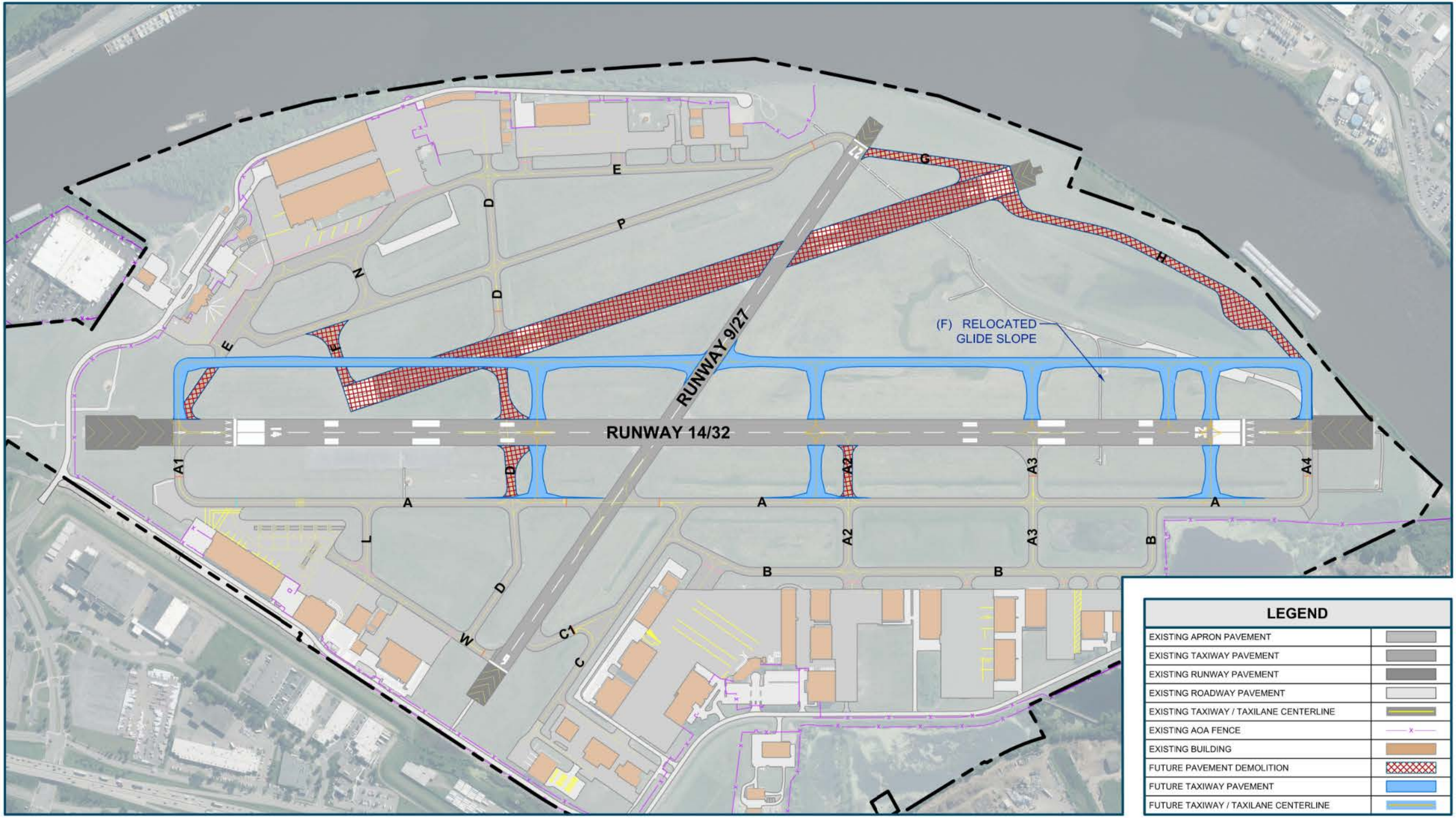
The proposed east side parallel taxiway is connected to Runway 14/32 through a series of strategically placed entrance and exit connectors. Runway end connectors are provided at both the Runway 14 and Runway 32 ends to allow full-length access to the runway in both directions. Additional mid-field connectors are included to support efficient distribution of traffic along the runway corridor and to minimize taxi distances for aircraft accessing adjacent development areas.

Special consideration was given to the placement of connectors at the Runway 32 end due to the impact of floodwall deployment conditions. As described in **Chapter 3**, the usable runway length is reduced and the displaced threshold location shifts when the floodwall is in place. To maintain operational access to the full usable runway under these conditions, three additional runway entrance and exit connectors are required. On the west side of the runway, this connection aligns with the displaced threshold location during floodwall operations. This connection is also mirrored on the east side to allow direct runway crossing. However, the presence of the temporary floodwall creates a constraint by introducing an obstruction within the TOFA. To maintain compliance with FAA design standards, the east side includes an additional Runway 32 connector just to the north to avoid TOFA penetration, resulting in staggered entrance and exit locations on either side of the runway when the floodwall is up. While this configuration introduces some asymmetry, aircraft requiring use of the full runway length can be routed via Taxiway A on the west side to access the Runway 32 threshold.

The placement of the remaining connectors along the runway was informed by a detailed Runway Exit Design Interactive Model (REDIM) analysis. The analysis evaluated baseline and alternative scenarios to confirm optimal runway exit locations and quantify the impact on runway occupancy time (ROT). The results demonstrate that the addition of new runway exits provides a meaningful reduction in average ROT compared to existing conditions, improving overall runway efficiency.

Under baseline conditions, the average ROT was approximately 69 seconds, while incorporation of additional exits reduced ROT to approximately 48–49 seconds. When exit locations were further optimized, average ROT decreased to approximately 46–47 seconds, representing a total reduction of more than 20 seconds compared to existing conditions. Consistent with the REDIM findings, connectors along the east side parallel taxiway are located to balance operational efficiency with geometric feasibility and are paired with corresponding connectors on the west side where practical. This approach supports efficient runway exit usage for both arrival directions and distributes traffic more evenly across the airfield.

In addition to the introduction of new taxiway infrastructure, this alternative includes targeted modifications to existing taxiway geometry to mitigate runway incursion risk. Taxiway A2 is shifted north to minimize direct access from apron areas to the runway, reducing the potential for unauthorized or unintended runway entry. Similarly, the Taxiway D connector is shifted south to improve alignment and reduce direct access conflicts. This alternative is depicted below in **Figure 4.8**. In coordination with key stakeholders and airport management, this alternative was identified as the preferred taxiway configuration for Runway 14/32.



LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 350 700 1400
SCALE (in ft.)

N

Kimley»Horn

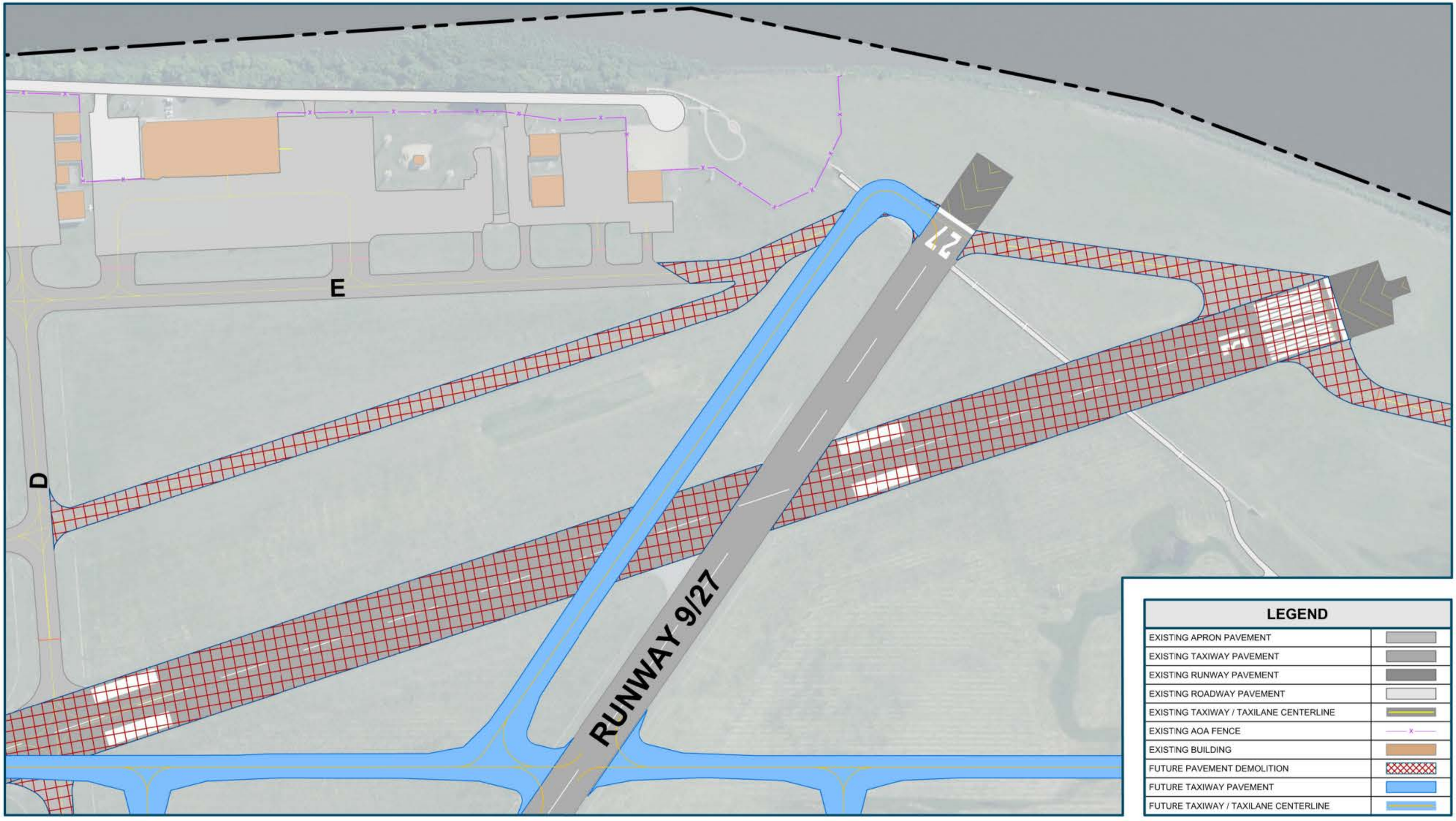
FIGURE 4.8 OCTOBER 2026

TAXIWAY ALTERNATIVE A: FULL LENGTH
RUNWAY 14/32 EAST SIDE PARALLEL TAXIWAY

4.5.2. Taxiway Alternative B: Runway 9/27 North Side Partial Parallel Taxiway

In the same way, the proposed removal of Runway 13/31 alters airfield circulation patterns on the northeast side of Runway 9/27, creating both a loss of connectivity and an opportunity to improve taxiway geometry and standards compliance. Under existing conditions, portions of Taxiway E provide access to the Runway 27 end; however, this configuration includes a non-standard, acute-angle runway entry that presents potential operational and runway incursion concerns. In addition, removal of taxiways associated with Runway 13/31 reduces direct connectivity in this area, requiring a reconfigured taxiway system to maintain efficient access to the runway.

This alternative proposes the development of a partial parallel taxiway along the north side of Runway 9/27, extending from the Runway 27 threshold westward and connecting to the proposed full-length parallel taxiway system along Runway 14/32. As depicted in the concept shown in **Figure 4.9**, this new taxiway alignment runs parallel to Runway 9/27 while maintaining appropriate separation from runway safety areas and object free areas. To support this configuration, the existing Taxiway E connection to the Runway 27 end would be removed and replaced with a perpendicular entrance/exit connector to Runway 9/27. The concept was refined through coordination with airport management, resulting in consensus around its advancement as the preferred development approach for this portion of the airfield.



LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 100 200 400
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.9 OCTOBER 2026

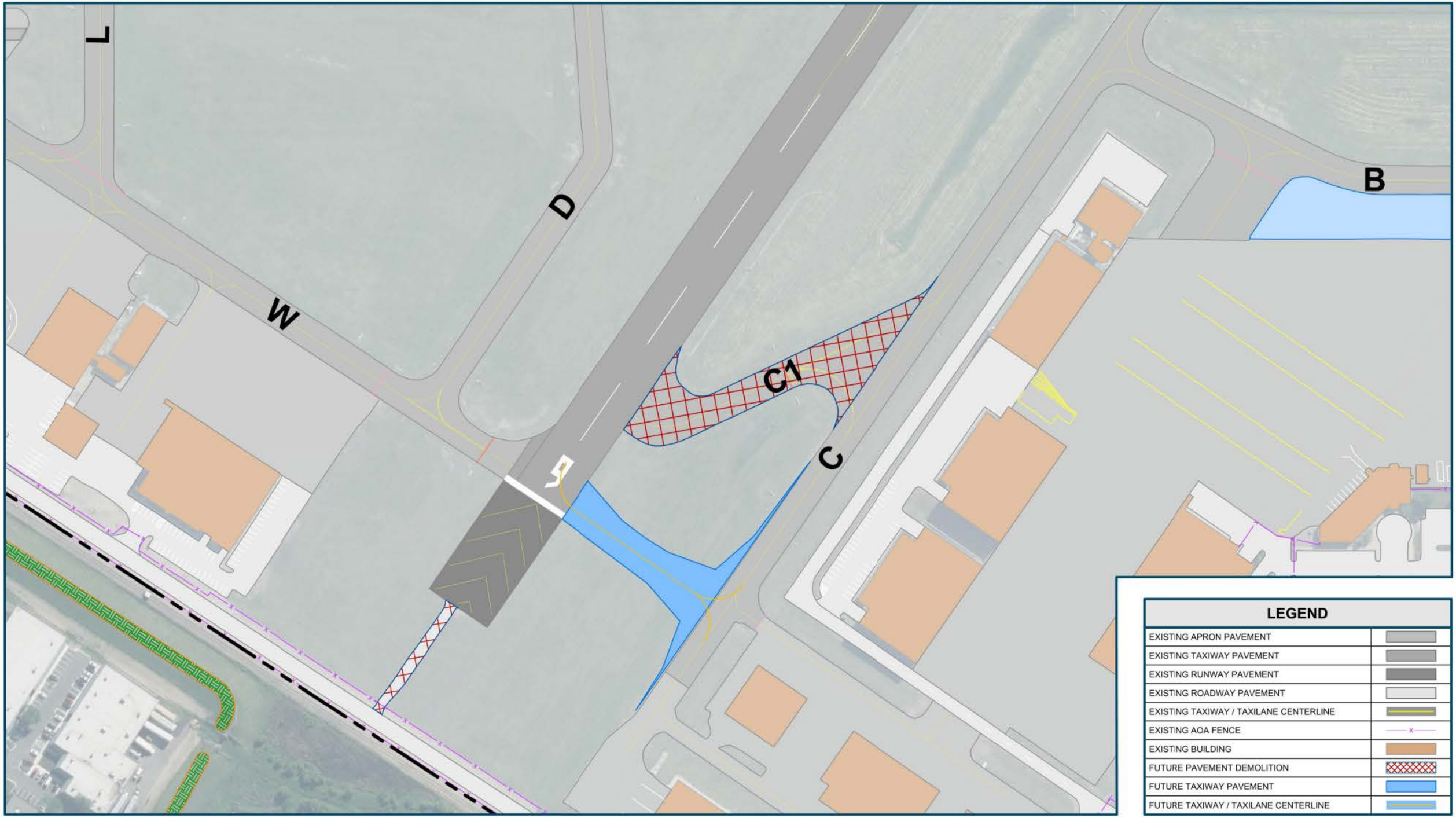
TAXIWAY ALTERNATIVE B: RUNWAY 9/27 NORTH SIDE PARTIAL PARALLEL

4.5.3. Taxiway Alternative C: Taxiway C1 Relocation

As identified in **Chapter 3**, Taxiway C1 represents a non-standard condition due to its unconventional geometry and placement. The existing alignment approaches Runway 9 at an angle rather than providing a perpendicular connection and does not extend to the runway threshold, limiting direct access to the full usable length of the runway and reducing operational efficiency.

This alternative proposes relocating Taxiway C1 to the west and realigning it to intersect Runway 9 at the runway threshold, as shown in **Figure 4.10**. The redesigned geometry provides a 90-degree entrance and exit configuration, consistent with FAA design best practices for standard taxiway-runway connections. By shifting the taxiway west and establishing a direct connection at the runway end, this concept improves aircraft access to the full runway length, and the improved geometry reduces potential confusion associated with the current layout.

Given the clear operational and safety benefits achieved through this realignment and the ability to fully address the identified non-standard condition, Airport management did not advance additional alternatives for this location. This concept has therefore been identified as the preferred development approach for the relocation of Taxiway C1.



LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 75.5 150 300
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.10 OCTOBER 2026

TAXIWAY ALTERNATIVE C: TAXIWAY C1 RELOCATION

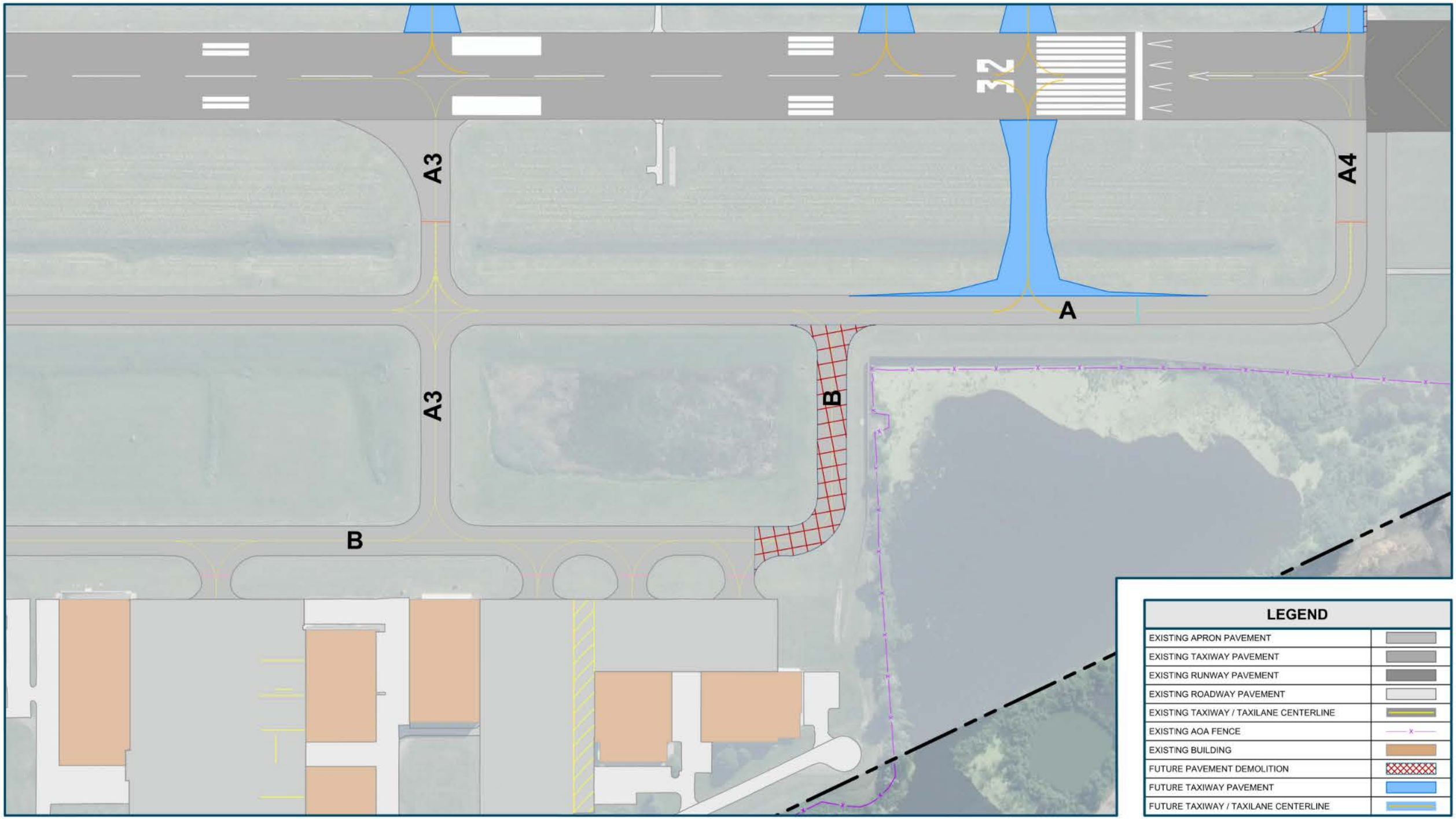
4.5.4. Taxiway Alternative D: Taxiway B Connector Removal

The southernmost Taxiway B connector to Taxiway A currently operates under a non-standard condition due to the proximity of a permanent floodwall encroaching into the TOFA. As documented in the Facility Requirements chapter, this condition reduces available wingtip clearance and requires a MOS, limiting use of this taxiway segment to TDG 2 aircraft and restricting access for larger TDG 3 aircraft that are anticipated to play a greater role in the Airport's future fleet mix.

To address this constraint, multiple approaches were considered, including maintaining the existing configuration with operational restrictions or modifying the taxiway alignment to achieve standards compliance. However, realigning Taxiway B to the north would introduce environmental impacts associated with adjacent wetlands and could create an undesirable direct access alignment to Runway 14/32, which is inconsistent with FAA runway incursion mitigation principles.

As shown in **Figure 4.11**, this alternative proposes removal of the affected Taxiway B connector segment entirely, eliminating the portion of pavement constrained by the floodwall. Aircraft circulation would instead be routed north via Taxiway B to Taxiway A3 for access to Taxiway A. This routing pattern is already utilized in practice by larger TDG 3 aircraft operating in this area, indicating that the proposed circulation concept is operationally feasible and consistent with existing pilot behavior.

By removing the Taxiway B connector, this alternative eliminates the TOFA intrusion and removes the need for an MOS at this location, restoring compliance with FAA design standards and supporting unrestricted use by TDG 3 aircraft. While the alternative introduces a modest increase in taxi distance for certain users, it simplifies the airfield geometry, avoids environmentally sensitive areas, and provides a long-term, standards-compliant solution that aligns with the Airport's transition toward a TDG 3 taxiway system. It is, therefore, the preferred long-term mitigation solution for this non-standard condition.



LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 75.5 150 300
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.11 OCTOBER 2026

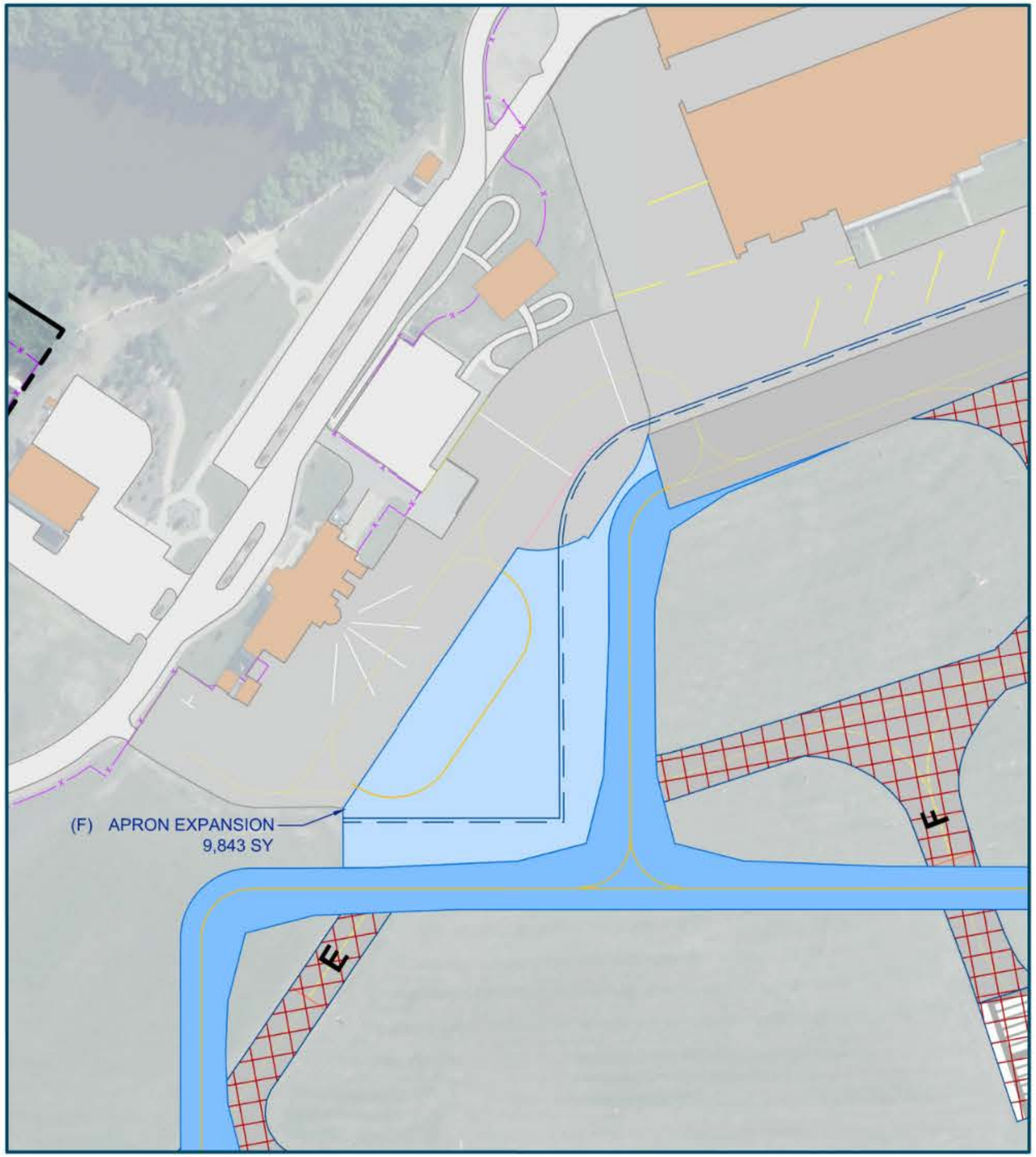
TAXIWAY ALTERNATIVE D:
TAXIWAY B CONNECTOR REMOVAL

4.5.5. Taxiway Alternative E: Taxiway E Realignment

Existing Taxiway E currently includes non-standard geometry at both its Runway 14 and Runway 27 connections, where acute-angle entrance and exit configurations limit pilot visibility and introduce potential runway incursion risk. These conditions are inconsistent with FAA RIM design guidance, which favors perpendicular taxiway connections to improve operational clarity and safety.

This alternative proposes targeted relocation and reorientation of key segments of Taxiway E to achieve more standard, perpendicular connections at both runway ends. Along the terminal apron, the portion of Taxiway E connecting to Runway 14/32 would be realigned at a 90-degree angle to Runway 14/32 and tied directly into the proposed full-length parallel taxiway along the east side of Runway 14/32. At the west end, near the Learning Jet facility, the existing Taxiway E segment connecting to the Runway 27 end would be reconfigured as a perpendicular to the proposed partial parallel taxiway along the north side of Runway 9/27, consistent with the broader reconfigured taxiway network in this area.

Given the prioritization of a full-length parallel taxiway along Runway 14/32 and a partial parallel taxiway along Runway 9/27 within the overall airfield development framework, this alternative was identified as the preferred approach for Taxiway E realignment and is depicted in **Figure 4.12** below.



LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE APRON PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 75.5 150 300
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.12 OCTOBER 2026

TAXIWAY ALTERNATIVE E: TAXIWAY E REALIGNMENT

4.5.6. Taxiway Alternative F: Engine Run-up Area Standardization

As discussed in Chapter 3, AC 150/5300-13B introduced substantial revisions to airport design standards based on extensive research, operational experience, and runway safety analyses. A key component of this effort was the FAA's Runway Incursion Mitigation (RIM) Program, which identified airfield configurations that have historically increased the risk of surface incidents and runway incursions. Among the characteristics highlighted in the AC are wide expanses of pavement, which can reduce the effectiveness of visual cues by placing critical signs, markings, and other guidance elements outside a pilot's primary field of view.

One such condition exists near the Runway 14 end of the airfield at the intersection of Taxiways A and A1, adjacent to the Minnesota Army National Guard Aviation Facility. This paved area currently functions as an engine run-up area for smaller aircraft; however, its geometry does not conform to the design principles established in AC 150/5300-13B. Additionally, the area lacks centerline and positioning guidance to ensure aircraft remain clear of the TOFA associated with aircraft operating on Taxiway A1.

To address these deficiencies, the preferred alternative includes reconstructing the engine run-up area to meet the design requirements for TDG 2 and ADG II aircraft, as illustrated in **Figure 4.13**. The proposed design incorporates standardized geometry and centerline guidance that establish a clearly defined aircraft position. This configuration ensures TOFA clearance for ADG II aircraft utilizing the run-up area while maintaining adequate wingtip clearance for passing ADG III aircraft on Taxiway A1.

Although engine run-up areas are ideally located along a longer parallel section of taxiway, site constraints associated with the Minnesota Army National Guard Aviation Facility limit available alternatives. As a result, the area near the intersection of Taxiways A and A1 represents the most practical and feasible location for this facility.

14

LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 40 80 160
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.13 OCTOBER 2026

TAXIWAY F: WIDE EXPANSE OF PAVEMENT REMOVAL

4.5.7. Taxiway Alternatives Summary

The taxiway alternatives were developed to support the preferred runway configuration while improving airfield circulation, safety, and FAA standards compliance within the Airport's constrained footprint. These alternatives are summarized below in **Table 4.4**.

Table 4.4 - Preferred Taxiway Alternatives

Taxiway Alternative	Description	Primary Benefit
A – Full-Length Parallel Taxiway (Runway 14/32)	Development of a full-length parallel taxiway on the east side of Runway 14/32 with optimized connectors	Reduces runway crossings, improves circulation, reduces runway occupancy time, supports dual-side development
B – Partial Parallel Taxiway (Runway 9/27)	Development of a north-side parallel taxiway with perpendicular connector at Runway 27	Improves access, standardizes taxiway geometry, removes acute-angle connection, enhances safety
C – Taxiway C1 Relocation	Relocation and realignment to a 90-degree runway connection at the threshold	Standardizes taxiway geometry and improves runway access
D – Taxiway B Connector Removal	Removal of non-compliant connector affected by floodwall TOFA intrusion	Eliminates MOS requirement without environmental impacts of relocating the floodwall; supports TDG 3 aircraft
E – Taxiway E Realignment	Realignment to provide perpendicular runway connections and integrate with new taxiway system	Standardizes primary entrance point for aircraft on Runway 14 approach end
F – Wide Expanse of Pavement Removal	Development of a full-length parallel taxiway on the east side of Runway 14/32 with optimized connectors	Reduces runway crossings, improves circulation, reduces runway occupancy time, supports dual-side development

Sources:
Kimley-Horn, 2026.

4.6. Land Development Opportunities

This section evaluates land development alternatives to support future aeronautical growth and more efficient use of airport property. The concepts focus on maximizing developable land, improving access, and integrating development with the preferred airfield layout.

4.6.1. Southwest Development Alternative

This alternative focuses on maximizing hangar development and apron capacity on the southwest portion of the airfield, where demand for corporate and transient facilities has been identified. Under this concept, the remaining undeveloped areas west of the existing Best Jets and Minnesota Jet hangars are fully built out to accommodate additional aeronautical development.

West of the existing Best Jets facilities, three new large box hangars are proposed, along with a corresponding expansion of the apron to support aircraft storage, maneuvering, and access. An additional large box hangar is proposed west of the existing Minnesota Jet hangar, providing a total of over 96,700 square feet of new aircraft storage capacity to meet growing demand for corporate-based

aircraft. The 7,012-square-yard expansion of apron areas in this zone is intended to create a continuous and functional aircraft parking and circulation area across this portion of the airfield, improving operational efficiency and reducing localized congestion.

In addition to landside expansion west of the existing hangars, this alternative includes apron improvements east of the Signature apron. This expansion totals 3,158 square yards and extends toward Taxiway B, providing additional paved area for aircraft positioning. The added apron surface in this location is intended to mitigate periodic taxiway excursions experienced during winter operations, when pavement edges and grades can be difficult to distinguish. By providing a wider, more forgiving paved surface, this improvement enhances operational safety while also increasing transient apron capacity and flexibility.

This alternative, shown in **Figure 4.14**, efficiently utilizes available space on the southwest side of the airfield to address both near- and long-term demand for hangar storage and apron capacity, while also improving aircraft circulation and operational safety in a known constrained area. The concept was refined through coordination with tenants, airport management, and key stakeholders, resulting in consensus around its advancement as the preferred development approach for this portion of the airfield.

(F) APRON EXPANSION
3,158 SY

(F) APRON EXPANSION
7,012 SY

(F) HANGAR DEVELOPMENT
96,772 SF

LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE APRON PAVEMENT	
FUTURE ROADWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	
FUTURE BUILDING	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 100 200 400
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.14 OCTOBER 2026

SOUTHWEST DEVELOPMENT ALTERNATIVE

4.6.2. Northeast Development Alternatives

The removal of Runway 13/31 creates additional development opportunities within the Northeast Development Area, expanding the land available for future aeronautical uses. Two alternatives were developed and evaluated under this scenario.

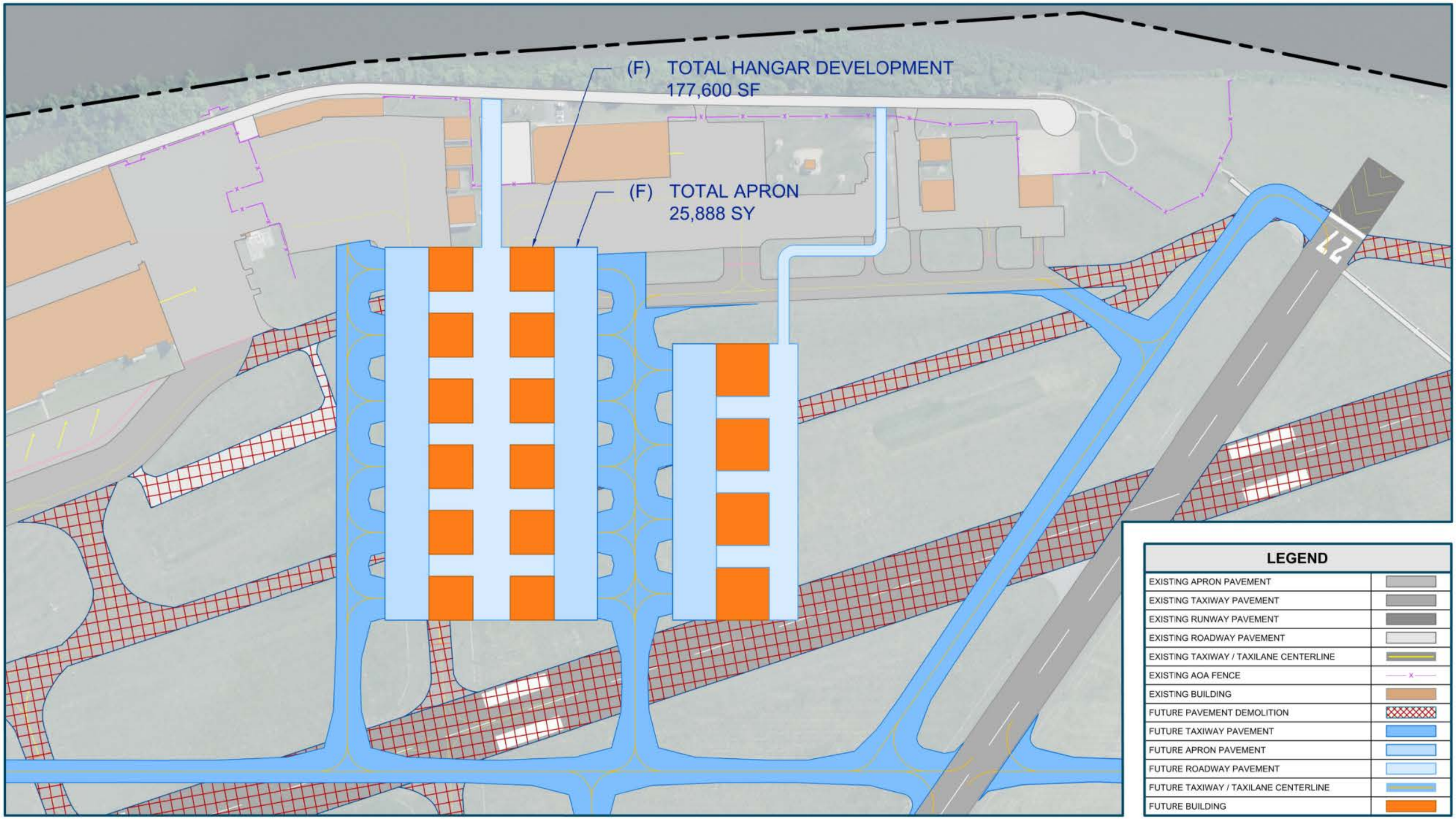
4.6.2.1. NE Alternative A: Taxiway D Removal Concept

This alternative assumes the full removal of Taxiway D, a partial removal of Taxiway E, and the incorporation of the remaining segments of Taxiway E into the layout. This creates a contiguous redevelopment area that allows for a more efficient and flexible layout of hangar and apron facilities. By eliminating the existing taxiway segmentation, this concept reconfigures both landside access and airside circulation to better accommodate long-term demand for corporate and general aviation development.

A new landside vehicle service road is introduced from Bayfield Street, located north of the Momentum Aeronautics hangar. This access road extends south through the center of the proposed development area and provides direct access to two parallel rows of new box hangars positioned along its alignment. This configuration establishes a clear separation between landside vehicle circulation and airside aircraft movement areas, while maintaining efficient access to individual hangar parcels.

Airfield access is provided by two new east-west-oriented taxiways located along the north and south sides of the primary hangar rows. These taxiways extend from the existing GA and Momentum Aeronautics hangar areas on the east to a proposed full-length parallel taxiway to the west, which runs perpendicular to the new development.

An additional row of box hangars is also accommodated south of the primary development area, providing approximately 178,000 square feet of total additional hangar space with this alternative. Each hangar row is supported by adjacent apron space sized to accommodate aircraft storage, maneuvering, and access to the parallel taxiway system. The expanded apron areas total 25,888 square yards and provide continuous paved surfaces across the development area, improving operational efficiency and reducing congestion associated with fragmented apron layouts. A depiction of this concept is provided in **Figure 4.15**.



LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE APRON PAVEMENT	
FUTURE ROADWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	
FUTURE BUILDING	

STP

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 100 200 400
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.15 OCTOBER 2026

NORTHEAST ALTERNATIVE A: TAXIWAY D REMOVAL CONCEPT

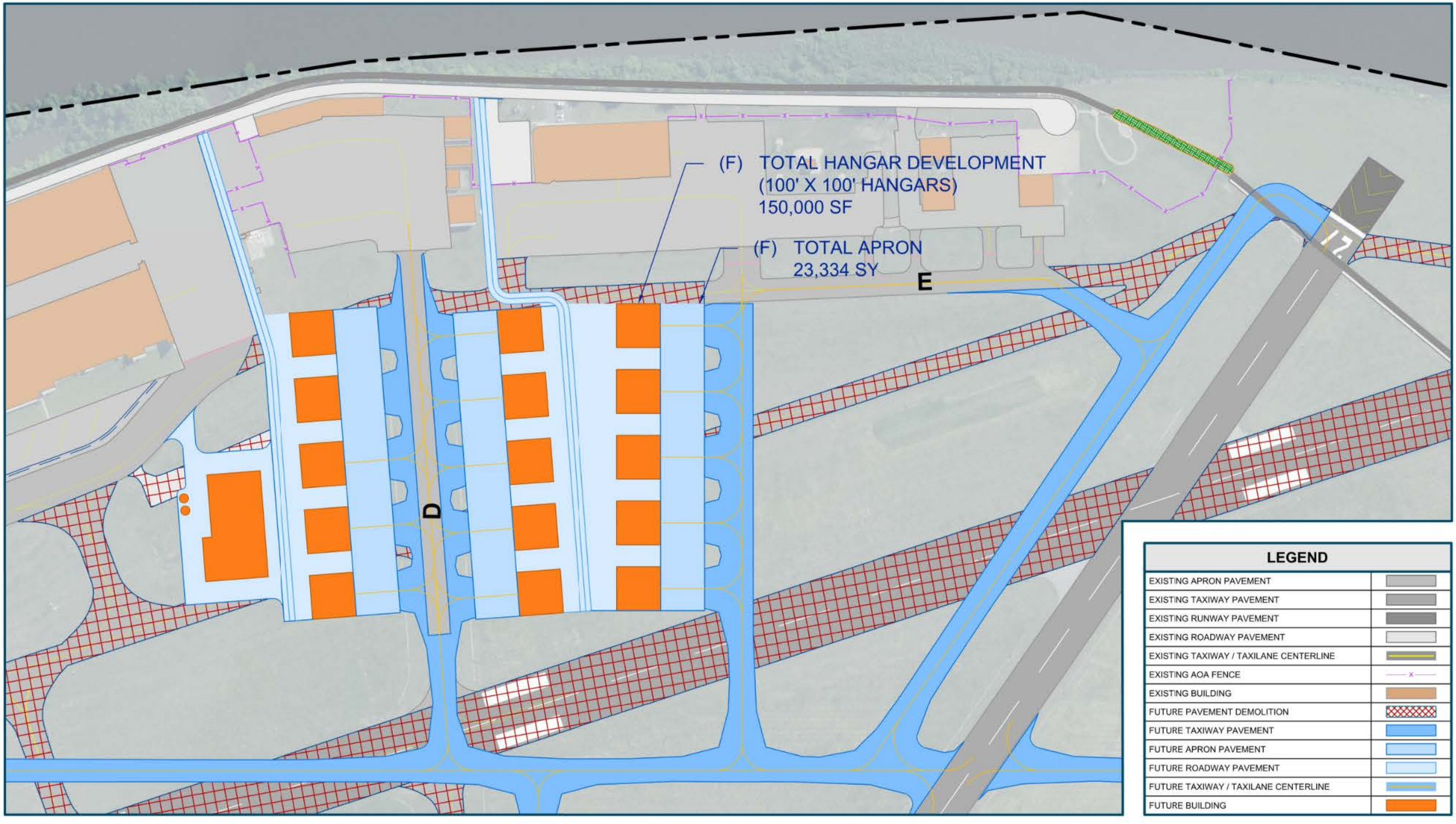
4.6.2.2. NE Alternative B: Taxiway D Retention Concept

This alternative retains a portion of Taxiway D and organizes the development layout around its alignment, extending new hangar and apron facilities to the north and south. By maintaining this segment of Taxiway D, the concept leverages existing pavement to support continued airfield circulation while accommodating expanded development within the surrounding area.

In contrast to the Taxiway D removal concept, this layout is structured with Taxiway D acting as a central airside spine between two northern rows of proposed box hangars. Apron areas and hangars border both sides of Taxiway D, creating a balanced arrangement that supports direct aircraft access to multiple facilities. Landside access is provided via vehicle service roads located along the outer edges of the development, rather than through its center, with associated parking areas situated behind the hangar rows. This configuration requires two points of access from Bayfield Street: one located along the south side of the 3M apron and another along the north side of the Momentum Aeronautics hangar.

Selective removal and incorporation of existing Taxiway E pavement is included as part of this concept to improve connectivity between the proposed development and the broader taxiway system. An additional row of box hangars may be accommodated south of the primary development area, supported by expanded apron space and a second parallel taxiway connection tying into the remaining Taxiway E segments and the proposed parallel taxiway of Runway 14/32. New hangar space proposed by this concept totals up to 150,000 square feet. Each row of hangars is supported by dedicated apron space sized to accommodate aircraft parking and maneuvering, creating a continuous, efficient, and functional paved area throughout the development totaling an additional 23,334 square yards. This alternative is depicted below in **Figure 4.16**.

Based on coordination with airport management and the ability to achieve similar development capacity while minimizing required pavement removal, this concept has been identified as the preferred development approach for this portion of the airfield.



LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE APRON PAVEMENT	
FUTURE ROADWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	
FUTURE BUILDING	

STP

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 100 200 400
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.16 OCTOBER 2026

NORTHEAST ALTERNATIVE A: TAXIWAY D RETENTION CONCEPT

4.6.2.3. NE Alternatives Evaluation

The Northeast Development alternatives were evaluated using the criteria established in Section 4.2 to compare their effectiveness in supporting development, maintaining efficient airfield circulation, and minimizing implementation complexity.

Alternative A (Taxiway D Removal Concept) consolidates the development area by removing Taxiway D and portions of Taxiway E, creating a flexible layout for hangar development. While this approach maximizes contiguous land area, it requires greater infrastructure removal and introduces new airfield circulation patterns that increase implementation complexity.

Alternative B (Taxiway D Retention Concept) retains Taxiway D as an organizing element, allowing development to occur around an established airside spine. This approach achieves comparable development potential while minimizing required modifications, maintaining established circulation patterns, and reducing overall implementation complexity.

As summarized in **Table 4.5**, Alternative B provides a more balanced and implementable solution, maintaining efficient airfield access while supporting long-term development objectives. Accordingly, Alternative B is identified as the preferred development concept for the northeast portion of the airfield.

Table 4.5 - Evaluation of Northeast Development Alternatives

Northeast Development Alternative	Airfield Safety & Design Compliance	Operational Capability & Flexibility	Floodwall Compatibility & Resiliency[(a)]	Development Potential & Land Use Efficiency	Implementation Feasibility & Cost	Total Score
A – Taxiway D Removal Concept	2	2	NA	3	1	**8**
B – Taxiway D Retention Concept	3	3	NA	3	3	**12**

Sources:
Kimley-Horn, 2026.

Scoring Legend:
0 = Does not satisfy evaluation criteria
1 = Provides some benefit, but short of fully satisfying evaluation criteria
2 = Satisfies evaluation criteria with minor challenges
3 = Satisfies evaluation criteria or no negative impact

Notes:
(a) This category is not applicable as both alternatives are unaffected by floodwall deployment.

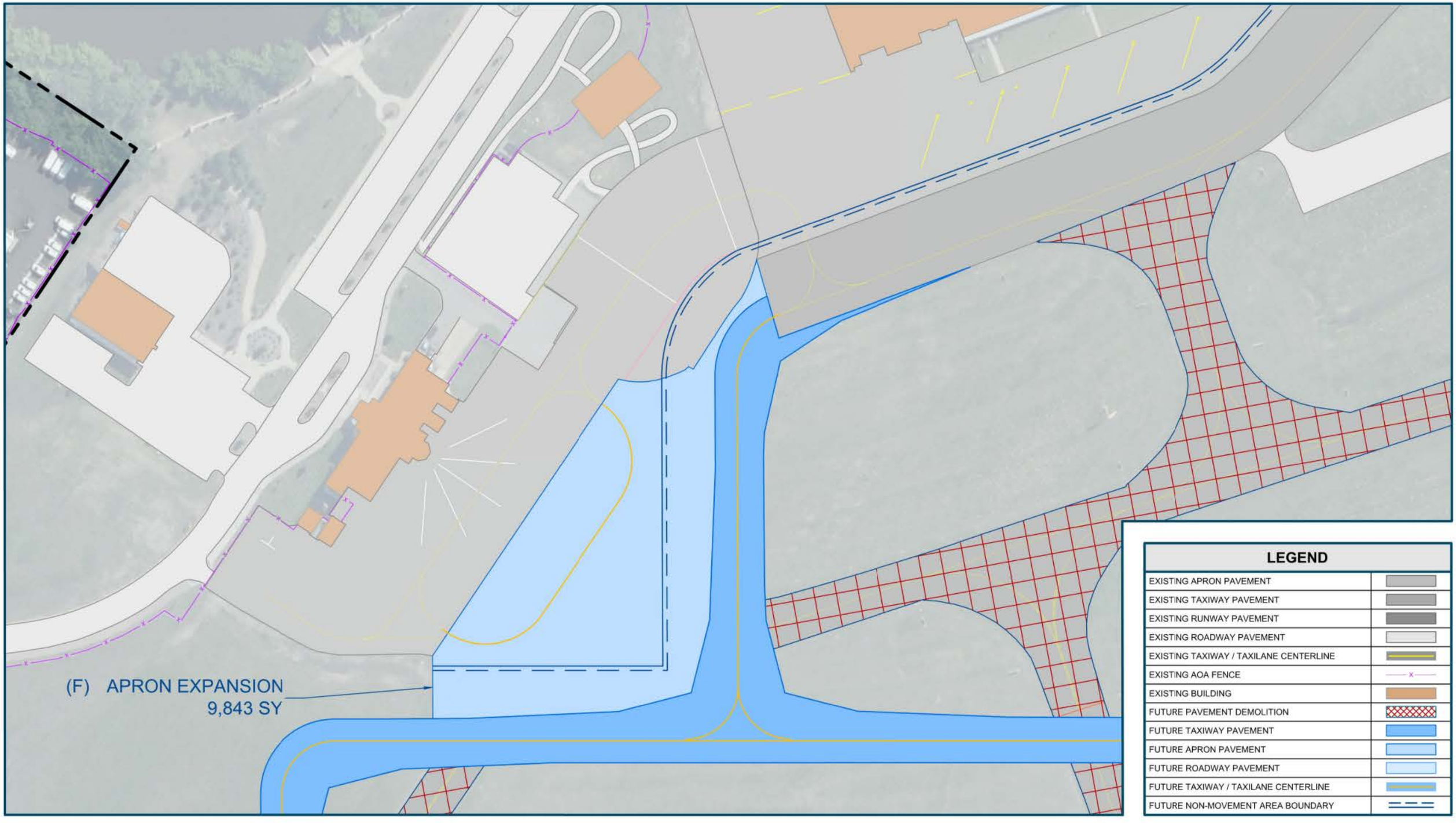
4.6.3. Terminal Apron Expansion Alternative

This concept leverages the proposed reconfiguration of Taxiway E to address existing non-standard conditions and, in doing so, creates additional developable space immediately south of the existing terminal apron. The realignment of Taxiway E results in a larger contiguous area between the terminal apron, the reconfigured taxiway system, and adjacent airfield facilities that can be utilized to expand apron capacity.

Under this concept the existing terminal apron is expanded southward beginning at the current intermediate hold position. The expanded apron area extends to connect with the proposed full-length parallel taxiway to the west, the redesigned Taxiway E alignment to the south, and the new U.S.

Customs and Border Protection (CBP) apron to the east. This configuration creates a continuous and cohesive apron surface that adds 9,843 square yards to the current terminal apron.

The additional apron space is intended to support transient aircraft operations, including staging, parking, and maneuvering. The expanded area also provides an opportunity to accommodate additional transient aircraft tie-down positions, helping to address demand during peak activity periods. This concept, depicted in **Figure 4.17**, makes efficient use of the space created by Taxiway E improvements, while strengthening overall airside connectivity between the terminal apron, CBP facilities, and the broader taxiway system. In discussions with airport management, this was determined to be the preferred concept for usage of this space.



LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE APRON PAVEMENT	
FUTURE ROADWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	
FUTURE NON-MOVEMENT AREA BOUNDARY	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 50 100 200
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.17 OCTOBER 2026

TERMINAL APRON EXPANSION ALTERNATIVE

4.7. Support Facility Alternatives

This section evaluates alternatives for key support facilities required to sustain long-term airport operations, addressing both near-term operational needs and longer-term development opportunities envisioned to meet the Airport's anticipated growth. The concepts focus on improving operational efficiency, consolidating critical functions such as maintenance activities into a centralized facility, and identifying strategic areas for emerging uses, including potential Advanced Air Mobility (AAM) development.

Each alternative is evaluated for its ability to support the preferred airfield layout, minimize impacts to developable land, and provide flexibility to accommodate evolving operational needs over the planning horizon.

4.7.1. Consolidated Maintenance Facility

The Facility Requirements chapter identified the need to consolidate existing maintenance, operations, and equipment storage functions into a single, purpose-built 32,000-square-foot Consolidated Maintenance Facility (CMF). This consolidation responds to operational inefficiencies associated with dispersed maintenance activities, limited storage capacity for equipment, and increasing demands to support airfield operations under both standard and floodwall deployment conditions.

A consolidated facility provides an opportunity to improve operational efficiency, centralize maintenance activities, and support long-term airfield development by reducing the footprint of existing maintenance uses across the Airport. The CMF is anticipated to accommodate maintenance vehicles, SRE, materials storage, administrative space, and associated support functions. Two alternatives were studied. Both alternatives incorporate a dedicated fueling facility to support airfield operations, including the provision of unleaded aviation fuel and diesel fuel for ground equipment.

The location of the CMF is a key planning consideration, as it must balance landside access, operational access to the airfield, compatibility with adjacent development areas, and overall land use efficiency. The preferred location should provide efficient access to primary airfield movement areas, maintain flexibility for future hangar development, and minimize conflicts with planned aeronautical development areas identified in **Section 4.6**. To support this evaluation, two CMF locations were analyzed and are described in the following sections.

4.7.1.1. CMF Alternative A: North of Northeast Development Area

Alternative A locates the consolidated maintenance facility just north of the proposed hangar development area. This location integrates the CMF into the broader redevelopment framework established in **Section 4.6** and is depicted in **Figure 4.18**.

Under this concept, the CMF is positioned within currently undeveloped space, allowing the facility to be centrally located within the northeast portion of the airfield while maintaining separation from primary aircraft movement areas. This configuration supports direct access to the proposed taxiway network while maintaining efficient landside access for maintenance vehicles and deliveries.

A key advantage of this alternative is its ability to preserve a greater portion of the northeast area for future hangar development. By locating the CMF outside the primary hangar footprint, this concept

maximizes the amount of contiguous land available for aeronautical development, supporting long-term revenue generation and tenant growth.

Operationally, the location provides adequate access to the airfield but may require additional coordination with the proposed taxiway system to ensure efficient routing of maintenance vehicles to all portions of the airfield. The location also places the CMF slightly removed from existing developed areas, which may introduce moderate infrastructure extension requirements for utilities and access.

(F) CENTRAL MAINTENANCE FACILITY
31,668 SF

LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE APRON PAVEMENT	
FUTURE ROADWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	
FUTURE BUILDING	

STP

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 50 100 200
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.18 OCTOBER 2026

CMF ALTERNATIVE A: NORTH OF NORTHEAST DEVELOPMENT AREA

4.7.1.2. CMF Alternative B: Northeast Development Area Integration

Alternative B locates the consolidated maintenance facility along Taxiway D, positioned immediately east of the northernmost row of proposed hangar development within the northeast portion of the airfield, as illustrated in **Figure 4.19**.

This location leverages existing and proposed pavement geometry to provide direct and efficient access to the airfield. By situating the CMF adjacent to Taxiway D, this alternative supports streamlined maintenance operations, allowing for rapid deployment of equipment to runway and taxiway systems during routine activities and winter operations.

A key advantage of this alternative is its operational efficiency. The proximity to Taxiway D reduces travel distances for maintenance vehicles and simplifies circulation patterns across the airfield. In addition, this concept is expected to reduce overall development cost and complexity by utilizing areas with more direct access to existing infrastructure.

However, this alternative introduces a tradeoff in terms of land use efficiency. The placement of the CMF within the developable area reduces the number of potential hangar sites, including the loss of space for approximately two box hangars within the northeast development concept. As a result, this alternative provides slightly less flexibility for long-term aeronautical development compared to Alternative A. Despite this tradeoff, the operational benefits associated with direct airfield access and efficient facility layout represent a strong advantage of this concept.



STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 75.5 150 300
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.19 OCTOBER 2026

CMF ALTERNATIVE A: NORTH OF NORTHEAST DEVELOPMENT AREA

4.7.1.3. CMF Alternatives Evaluation

The CMF alternatives were evaluated using the criteria established in **Section 4.2**, including airfield safety and design compliance, operational capability and flexibility, floodwall compatibility and resiliency, development potential and land use efficiency, and implementation feasibility and cost.

Alternative A performs strongly from a land use and development perspective. By locating the CMF outside the primary hangar development footprint, it preserves a greater amount of contiguous land for future aeronautical development and supports long-term flexibility within the northeast development area. However, its location is less integrated with the airfield circulation system, resulting in moderately lower operational efficiency and potentially higher infrastructure costs.

Alternative B performs most favorably from an operational and implementation standpoint. Its location adjacent to Taxiway D provides direct access to the airfield, improves response times for maintenance activities, and simplifies overall facility layout. This alternative also benefits from lower anticipated development complexity due to its proximity to existing or planned infrastructure. These advantages are partially offset by a reduction in developable land and a corresponding decrease in long-term hangar development potential.

As summarized in **Table 4.6**, Alternative B provides a more balanced and operationally efficient solution and is the preferred alternative for this facility.

Table 4.6 - Evaluation of Consolidated Maintenance Facility Alternatives

Consolidated Maintenance Facility Alternative	Airfield Safety & Design Compliance	Operational Capability & Flexibility	Floodwall Compatibility & Resiliency	Development Potential & Land Use Efficiency	Implementation Feasibility & Cost	Total Score
A – North of Northeast Development Area	2	2	2	3	2	**11**
B – Northeast Development Area Integration	2	3	2	2	3	**12**

Sources:
Kimley-Horn, 2026.

Scoring Legend:
0 = Does not satisfy evaluation criteria
1 = Provides some benefit, but short of fully satisfying evaluation criteria
2 = Satisfies evaluation criteria with minor challenges
3 = Satisfies evaluation criteria

4.7.2. Advanced Air Mobility (AAM) Development

AAM is an emerging area of aviation that includes the development of electric aircraft, some capable of vertical takeoff and landing, to transport people and cargo over short regional distances. In the Minneapolis–Saint Paul region, AAM is being explored as a long-term complement to the existing airport system, with early applications likely focused on cargo logistics, medical transport, and other specialized services rather than widespread passenger use.

While these technologies may offer quieter operations and lower emissions compared to conventional aircraft, their near-term role will depend on continued aircraft certification, infrastructure development, and integration into the National Airspace System (NAS). As such, AAM is not expected to replace

ground transportation or significantly reduce congestion in the near-term, but it may provide targeted benefits for specific use cases and support incremental economic and system efficiency improvements as the technology matures.

The Twin Cities region benefits from a resilient economy and a well-developed multimodal transportation network, which provides a strong foundation for integrating emerging aviation technologies. In this context, the Airport is well positioned to support the near-term adoption of AAM for several practical reasons.

1. STP is located in an urban environment with access to robust electrical infrastructure, including three-phase power, sufficient electrical capacity, and the ability to expand utility services as needed. This foundation is critical for supporting electric aircraft operations and the charging infrastructure required to enable them.
2. The Airport also has existing activity profiles that align with likely early AAM use cases. For example, medical transport operations already occur regularly at STP, demonstrating an established demand for time-sensitive aviation services that could benefit from emerging aircraft technologies. In addition, the Airport's proximity to downtown St. Paul positions it to potentially support future passenger operations, should regional AAM services become commercially viable.
3. STP has many of the core facilities needed to accommodate AAM aircraft. The Airport supports instrument approaches, includes heated hangar space for all-weather operations, and is served by two fixed-based operators (FBOs), providing maintenance, operational support, and pilot/passenger amenities when needed.

Given these considerations, airport management has elected to incorporate AAM into the LTP by identifying and reserving potential areas on the airfield that could support future AAM operations as the technology becomes viable. This section evaluates three potential site locations for AAM operations. Each site is situated in proximity to existing GA aprons to align with established flight operations while maintaining appropriate separation from primary runway ends to ensure safe integration with existing airspace. The candidate locations also consist of undeveloped or flexible-use areas, allowing for future implementation without conflict with planned airfield development. In addition, each site has been considered with respect to public accessibility while maintaining the safety and integrity of airport operations.

4.7.2.1. AAM Alternative I: South of Northeast Development Area Along Taxiway E

Alternative I is located north of Runway 9/27 near the Runway 27 end, positioned generally parallel to this runway and adjacent to the remaining segment of Taxiway E. The site is trapezoidal in shape and would become fully available following the removal of existing pavement. The total area of the site is approximately 9.0 acres.

This location is well positioned from a logistical standpoint. It is directly adjacent to several GA aprons and existing hangar facilities, allowing it to integrate with established flight operations and support infrastructure. The site also offers sufficient space for future development, includes access to a public gate, and provides a direct connection to Bayfield Street and the surrounding roadway network via a new VSR.

4.7.2.2. AAM Alternative II: North of Northeast Development Area Along Taxiway E

Alternative II is located north of the proposed northeast development area along Taxiway E, immediately west of the Riverside Hangars and apron. The site is generally triangular in shape, bounded to the south by the proposed VSR connecting to Bayfield Street and to the west by the Runway 14/32 building restriction line (BRL). The total area of the site is approximately 6.4 acres.

This location benefits from its proximity to the terminal and terminal apron area, supporting convenient access for potential operational and passenger-related activity. The site also makes efficient use of available airfield space while maintaining compatibility with adjacent planned development areas.

4.7.2.3. AAM Alternative III: Along Taxiway D and Taxilane Cedar

Alternative III is located along Taxilane Cedar directly across from established operational areas, including the St. Paul Flight Center FBO. The site is generally triangular in shape and encompasses approximately 3.1 acres between the BRLs for Runways 14/32 and 9/27 and Taxilane Cedar.

This location benefits from its proximity to existing aviation activities and support services, allowing for integration with established operations on the west side of the airfield. The site can accommodate key elements of AAM infrastructure within its footprint. However, compared to Alternatives I and II, this location offers a more limited development area and does not provide direct access to the VSR or Airport Road. These factors may constrain long-term flexibility and accessibility for future AAM operations.

4.7.2.4. AAM Development Alternatives Summary

The evaluation of Alternatives I, II, and III identifies multiple viable locations on the airfield that could support future AAM operations, each offering direct access to existing aviation infrastructure and compatibility with ongoing airfield activity. These alternatives are depicted in **Figure 4.20** below. Alternatives I and II provide greater development flexibility, access to the planned roadway network, and sufficient space for a range of potential facilities, while Alternative III offers a more constrained option that leverages proximity to established FBO operations.

Because AAM technologies, operating models, infrastructure requirements, and market demand continue to evolve, airport management has elected not to identify a preferred site at this time. Instead, all three alternatives will be retained as viable long-term options. This approach preserves flexibility and allows future implementation decisions to be guided by aircraft certification, regulatory requirements, industry partnerships, and demonstrated market demand.

Once an AAM development location is ultimately selected, the Airport's near-term objective will be to prepare the site to a pad-ready condition. For planning purposes, pad-ready means the development area would be graded and prepared for future construction, with utility connections extended to the site and capped, and stormwater infrastructure installed with connections stubbed to the side for future tie-in. No aircraft operating surfaces, charging infrastructure, vertiport facilities, buildings, or other AAM-specific improvements are proposed at this time. The ultimate configuration of the site will depend on the private-sector partnerships established to develop the facility, the operational requirements of the selected AAM aircraft, and the specific use cases that emerge as the industry matures.

This initial evaluation establishes a planning framework that can be refined through more detailed analysis as AAM technologies, regulatory guidance, and market demand continue to evolve within the region.

(F) AAM ALTERNATIVE II
6.4 ac

(F) AAM ALTERNATIVE I
9.0 ac

(F) AAM ALTERNATIVE III
3.1 ac

RUNWAY 14/32

RUNWAY 9/27

LEGEND	
EXISTING APRON PAVEMENT	
EXISTING TAXIWAY PAVEMENT	
EXISTING RUNWAY PAVEMENT	
EXISTING ROADWAY PAVEMENT	
EXISTING TAXIWAY / TAXILANE CENTERLINE	
EXISTING AOA FENCE	x
EXISTING BUILDING	
FUTURE PAVEMENT DEMOLITION	
FUTURE TAXIWAY PAVEMENT	
FUTURE APRON PAVEMENT	
FUTURE ROADWAY PAVEMENT	
FUTURE TAXIWAY / TAXILANE CENTERLINE	
FUTURE BUILDING	
FUTURE TEMPORARY FLOODWALL	
FUTURE BUILDING RESTRICTION LINE (35')	BRL
AAM DEVELOPMENT LOCATION ALTERNATIVE	

STP

MAC

SAINT PAUL DOWNTOWN AIRPORT
2045 LONG-TERM PLAN (LTP) UPDATE

0 300 600 1200
SCALE (in ft.)

N

Kimley»Horn

FIGURE 4.20 OCTOBER 2026

POTENTIAL LOCATIONS FOR AAM DEVELOPMENT AREA